Promotion of healthful beverage practices by parents of children (6-12 years)

A DISSERTATION

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL

OF THE UNIVERSITY OF MINNESOTA

BY

Arwa Asaad Zahid

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSPOHY

Marla Reicks, PhD, RD, Advisor

August 2017

Acknowledgements

First of all, I would like to thank God (Allah) for all the blessings that he has given me in my life.

Second, I would like to express my gratitude to my advisor Dr. Marla Reicks for all of her knowledge, guidance, advice, time, and patience. Also, it is a pleasure to thank those who made this dissertation complete: Dr. Lisa Harnack, Dr. Nicole Larson, and Dr. Len Marquart. It was an honor having all of you as a part of my committee.

Third, this dissertation would not have been possible without the support of my wonderful husband, Alaa Kolaibi, who has served as my rock since the beginning. He has been there for me, listening to me, and encouraging me. Moreover, I would like to thank my precious children, Talia, Marya, and Anas, for being in my life. Thank you, Talia, for helping me out a lot around the house, so I can finish my dissertation. Thank you, Marya, for encouraging me giving me a lot of hugs. Thank you, Anas, for adding extra joy to our family, when you were born during the PhD journey.

Last but not least, I owe my deepest gratitude to my dad, Asaad Zahid, who has made available his support in a number of ways. My dad always believed in me and encouraged me to continue my higher education, and most importantly never letting me give up. Also, I would like to thank my mom, Suzan Awad, and my sisters, Rawan and Wejdan, for being there for me and encouraging me along the way.

This dissertation is dedicated to

My father, Asaad Zahid, who raised me to be the person who I am today.

My grandfather, Mohammed Awad, who called me “Dr. Arwa”, ever since I was a little girl.

Abstract

Background: The prevalence of obesity among children (6-11 years) in the U.S. has increased from 7% to 20% in the past 30 years. Sugar-sweetened beverage (SSB) intake has been associated with weight gain among children. Energy imbalance and excessive weight gain from SSB consumption could lead to adverse health consequences in childhood and later in adulthood. Parents exert a strong influence on dietary intake of children based on the example they provide and the foods and beverages they make available at home. This dissertation investigated beverage parenting practices of parents of children (6-12 years) in three studies.

Methods and Results: Parent and child participants for the three studies were recruited at the Minnesota State Fair in 2014, 2015 and 2016 at the Driven to Discover Building, a building that houses University of Minnesota research studies. The same home beverage availability and parent beverage intake questionnaires that were previously evaluated for validity and reliability were used in all three studies.

Beverage intake among children: associations with parent and home-related factors (Study 1)

The first study was a cross-sectional study with parents and their early adolescent children (9-12 years). The purpose was to determine associations between beverage intakes among early adolescent children (9-12 years) and home- and parent-related factors. A survey was administered to 194 parents to assess usual beverage intake, home beverage availability and beverage nutrition knowledge. Early adolescents completed a

survey to assess usual beverage intake. Home availability of dairy beverages and parent dairy intake were positively associated with child dairy beverage intake. Home availability of SSBs was positively correlated with child SSB intake. Parent beverage knowledge about sugar was related to child dairy beverage intake. Results indicated that parental knowledge and parenting practices including managing beverage availability and role modeling may influence child beverage intake.

Gain-framed messages motivate sugar-sweetened beverage parenting practices more than loss-framed messages (Study 2)

The second study was a cross-sectional study with parents of children (6-12 years) that tested the effects of message framing (gain- vs. loss-framed) on behavioral intention of parents to role model healthful beverage intake and make healthful beverages available in the home for children (6-12 years). A survey was administered to 380 parents to assess usual beverage intake and home beverage availability. The survey included questions to test the effectiveness of message framing on behavioral intention to control home beverage availability and role model beverage intake. Gain-framed messages produced significantly greater intention to make healthful beverages available in the home and to role model healthful beverage intake than loss-framed messages.

Effectiveness of an online newsletter/text message intervention promoting beverage-related parenting practices: pilot test results (Study 3)

The third study was a single group, pre-post pilot intervention study. A 4-week, newsletter/text message intervention was developed and tested for parents of children (6-12 years) to improve home availability of healthful beverages and parental role modeling of healthful beverage intake. A survey (pre-test) was administered to parents (n=197) to assess usual parent beverage intake, home availability of beverages, and parent-reported child beverage intake. Parents received 3-weekly online newsletters as an email attachment in 2 formats (Pdf and an image) using gain-framed messages to promote healthful beverage parenting practices. They also received 6 text messages in the 3-week period consistent with the newsletter themes. One-hundred and seven parents completed the post-test survey with 100 parents having usable pre-post survey data. Positive effects were observed regarding parent beverage intake, parent-reported child beverage intake, and home beverage availability.

Conclusions: In the first study, making healthful beverages available in the home and role modeling healthful beverage intake were identified as strategic intervention targets for parents to decrease child SSB intake. Gain-framed messages were found to be more effective in the second study compared to loss-framed messages in motivating parents to engage in positive beverage parenting practices. In the third study, a brief newsletter/text message intervention was identified as a potentially useful method to promote positive beverage parenting practices.

Table of Contents

Acknowledgements i

Dedication ii

Abstract iii

List of Tables x

List of Figures xi

CHAPTER 1: INTRODUCTION 1

CHAPTER 2: LITERATURE REVIEW 3

I. CHILDHOOD OBESITY 3

A. Prevalence 3

B. Associated Health Problems 3

C. Factors Contributing to Childhood Obesity 5

II. CHILD BEVERAGE INTAKE 9

A. Sugar sweetened beverages 9

B. Dairy beverage intake 13

III. PARENTS' INFLUENCE ON CHILD BEVERAGE INTAKE 15

A. Role modeling 15

B. Availability 16

IV. INTERVENTION STRATEGIES TO IMPROVE BEVERAGE INTAKE OF CHILDREN 19

A. Previous interventions to improve beverage intake 19

B. Strategies used in prevention programs 21

V. REFERENCES (CHAPTER 1 AND 2) 26

CHAPTER 3: LITERATURE REVIEW SUMMARY AND RESEARCH OBJECTIVES AND HYPOTHESES 47

REFERENCES (CHAPTER 3) 51

CHAPTER 4: BEVERAGE INTAKE AMONG CHILDREN: ASSOCIATIONS WITH PARENT AND HOME-RELATED FACTORS 55

I. OVERVIEW 56

II. INTRODUCTION 57

III. MATERIALS AND METHODS 59

A. Participants 59

B. Parent questionnaire 60

C. Assessment of home beverage availability 60

D. Assessment of usual beverage intake 61

E. Demographic and physical characteristics 62

IV. DATA ANALYSIS 62

V. RESULTS 63

A. Participant characteristics 63

B. Home beverage availability 65

C. Beverage intake and knowledge scores 66

D. Associations between beverage intake and parent and home-related factors 69

VI. DISCUSSION 70

VII. CONCLUSIONS 73

VIII. REFERENCES (CHAPTER 4) 75

CHAPTER 5: GAIN-FRAMED MESSAGES MOTIVATE SUGAR-SWEETENED BEVERAGE PARENTING PRACTICES MORE THAN LOSS-FRAMED MESSAGES 84

I. OVERVIEW 85

II. INTRODUCTION 86

III. METHODS 88

A. Participants 88

B. Message Development 88

C. Questionnaire Components 90

IV. DATA ANALYSIS 91

V. RESULTS 92

VI. DISCUSSION 96

VII. SUPPLEMENTAL FILE 99

VIII. REFERENCES (CHAPTER 5) 100

CHAPTER 6: EFFECTIVENESS OF AN ONLINE NEWSLETTER/TEXT MESSAGE INTERVENTION PROMOTING BEVERAGE-RELATED PARENTING PRACTICES: PILOT TEST RESULTS 104

I. OVERVIEW 105

II. INTRODUCTION 106

III. MATERIALS AND METHODS 107

A. Participants *107*

B. Intervention *108*

C. Outcome evaluation *108*

IV. DATA ANALYSIS 110

V. RESULTS 110

VI. DISCUSSION 116

VII. REFERENCES (CHAPTER 6) 119

CHAPTER 7: COMPLETE LIST OF REFERENCES FOR DISSERTATION.... 123

CHAPTER 8: APPENDICES 158

8.1 Parent report of home availability of beverages (Study 1, 2, and 3) *158*

8.2 Usual parent beverage intake (Study 1, 2, and 3) *159*

8.3 Child frequency of beverage intake (Study 1) *160*

8.4 Parent beverage nutrition knowledge (8 items) (Study 1) *161*

8.5 Dairy/calcium knowledge (8 items) (Study 1) *163*

8.6 Knowledge about sugar in beverages (7 items) (Study 1) *164*

8.7 Child beverage intake reported by parents (Study 3) *166*

8.8 Newsletters (Study 3) *167*

List of Tables

Table 4.1 Demographic characteristics of parent and child participants in a cross-sectional survey ……64

Table 4.2 Parent-reported frequency of availability of beverages at home in a cross-sectional survey ……66

Table 4.3 Self-reported beverage intake of parents and children in a cross-sectional survey based on frequency and amount consumed ……...68

Table 4.4 Associations between child SSB and dairy beverage intakes and parent and home-related factors based on multiple logistic regression models ……70

Table 5.1 Demographic characteristics of parent survey respondents……...92

Table 5.2 Behavioral intention for parenting practices based on message valence……95

Table 6.1 Baseline demographic and physical characteristics of parents and children……112

Table 6.2 Parent-reported availability of beverages at home from pre- to post-intervention……..113

Table 6.3 Parent-reported parent and child beverage intake from pre- to post-intervention……114

List of Figures

Figure 5.1 Two parenting practices intended to achieve the same outcome based on gain- and loss-framed messages.……89

CHAPTER 1: INTRODUCTION

Soft drink consumption is the number one energy source for adolescents in the U.S. (14-18 years) and the 3rd source of energy for all children and adolescents. Children 2-19 years consumed a mean of 155 calories/day from sugar-sweetened beverages (SSBs) based on nationally representative dietary intake data (National Health and Nutrition Examination Survey (NHANES)) from 2001-2010[1]. From 1999-2008, NHANES data showed that heavy consumption (>500 calories/day) of SSBs increased among U.S children [2]. Recent data suggest a decline in SSB consumption among children and adolescents [3,4], however intake is still considered a concern that should be addressed in childhood obesity interventions.

A systematic review of 32 articles showed that weight gain among children was associated with intake of SSBs [5]. Parents exert a strong influence on dietary intake of children based on setting an example, making foods and beverages available at home, setting rules or expectations for what their children eat or drink, and through advice and encouragement [6,7]. Although some studies have examined the relationship between these factors and SSB intake among children (9-11), little is known about the role that parental instrumental knowledge about beverages may play in SSB intake of their children, particularly the composition, portion sizes, recommendations for intake and influence on health and weight status. Using Social Cognitive Theory as an organizing framework, instrumental knowledge and parenting practices, such as role modeling and making foods

and beverages available, are considered part of the social and physical environment which can be manipulated to change dietary behaviors of children.

This dissertation addressed the promotion of healthful beverage parenting practices by parents of children (6-12 years) in several ways. First, associations were examined between parent- and home-related factors influencing child beverage intake. Second, gain- vs. loss-framed messages were tested for their ability to change parent motivation to engage in positive beverage parenting practices. Lastly, a brief newsletter, text message-based intervention was developed and pilot-tested to improve beverage parenting practices.

Following this introduction (Chapter 1), a review of relevant literature is presented (Chapter 2). Chapter 3 is a summary of the literature review and introduces the specific research objectives for the three studies. Chapter 4 is a report on the first study that examined associations between beverage intake among 9-12 year-old children and parent- and home-related factors. The second study is presented in Chapter 5 where the effects of message framing (gain- vs. loss-framed) were determined on behavioral intention of parents to role model healthful beverage intake and to make healthful beverages available in the home for children (6-12 years). Chapter 6 is a report on the third study which tested the effectiveness of a pilot newsletter/text message intervention for parents of children (6-12 years) to improve home availability of healthful beverages and parental role modeling of healthful beverage intake. A comprehensive list of references is provided in Chapter 7 and appendices are provided in Chapter 8.

CHAPTER 2: LITERATURE REVIEW

I. Childhood Obesity

A. Prevalence

The high prevalence of overweight and obesity among children and adolescents is a public health concern. When a child or an adolescent (2–19 years) has a body mass index (BMI) greater than or equal to the 95th percentile for age and sex, he or she is considered obese[8]. Children and adolescents are considered overweight when they have a BMI at or above the 85th percentile, and lower than the 95th percentile. The prevalence of obesity among children and adolescents (2-19 years) in the U.S. was approximately 17% or about 12.7 million based on NHANES data collected in 2011- 2014[9]. According to a survey of 9th grade students in most schools across Minnesota in 2016, 8% and 13% of girls were obese and overweight, respectively; and 13% and 15% of boys were obese and overweight, respectively[10]. Recent studies reported no change in obesity trends among children and adolescents between 2003-2004 and 2011-2012 except for a decline among younger children (2-5 years old)[11]. However, the prevalence of childhood obesity is still high and considered a problem that should be monitored and addressed.

B. Associated Health Problems

Childhood obesity increases the risk of short and long-term health problems[12]. Consequently, the medical costs related to obesity in the United States increase each year. These costs totaled about $190 billion in 2012[13]. Children who are obese have a greater risk of being obese as an adult[12,14,15]. In addition, obese children have an increased risk

for several diseases and obesity-related conditions in adulthood, including type 2 diabetes, cardiovascular disease, hypertension, and cancer[12,14,15]. Obesity in children leads to insulin resistance which contributes to an increased incidence of type 2 diabetes[16]. Hypertension is three times more likely to occur in obese children than non-obese children[17]. Marcovecchio and colleagues[18] showed that obesity-related hypertension is associated with cardiovascular complications during childhood and poses an increased risk of coronary heart disease in adulthood. Moreover, overweight children are more susceptible to adverse cardiovascular disease risk factors in adulthood compared with normal weight children[19]. The adverse health consequences of obesity for children and adolescents include the risk of developing several cancers in adulthood[20]. Studies showed a strong relationship between the increased risk of breast cancer as an adult and obesity in childhood[21–23]. For example, overweight children had a high risk of cancer in later life[24] and high BMI (above the 85th percentile) during adolescence was associated with an increased risk of death from colon cancer for both males and females in adulthood[25].

Breathing and sleep behaviors are impacted by a child's weight status. Obese subjects are at higher risk than normal weight subjects for having fat deposition in the upper airway anatomy[26]. Therefore, childhood obesity can cause difficulty breathing, which can make any physical activity difficult. Also, shortness of breath could increase the symptoms or raise the possibility of developing asthma[27]. Obesity and obstructive sleep apnea commonly co-exist, therefore risk factors for developing sleep apnea or sleep disorders include childhood overweight[26] and obesity[27,28]. Nearly 40% of obese people have

obstructive sleep apnea, and almost 70% of patients who have obstructive sleep apnea are obese[29].

Childhood obesity is associated with emotional problems. Obese children can experience emotional health consequences, such as low self-esteem, negative self-body image, and depression [30]. Researchers have struggled to determine if obesity leads to depression or depression leads to obesity. Some obese children could be socially isolated, which can cause emotional and social problems like depression[31]. Negative stereotyping, discrimination, teasing, bullying, and social marginalization are some of the social health consequences that obese children experience [32–35]. Moreover, child abuse such as physical abuse, verbal abuse, and neglect are linked to an increased risk of obesity in adulthood [35,36].

C. Factors Contributing to Childhood Obesity

The etiology of childhood obesity is complex and multi-faceted. Common factors that can contribute to excess weight in youth in the US are dietary and physical activity behaviors, also known as energy balance-related behaviors, the food and physical activity environment including the way that less healthful foods are marketed and promoted, and education and skills[8]. Energy balance-related behaviors of interest for their contribution to overweight and obesity among children have been suggested to include SSB intake, skipping breakfast, and lack of physical activity and sedentary behaviors[37–40]

1. Physical activity and sedentary behaviors

Only about one quarter of children and adolescents (6-15 years) in the U.S. met the 2008 Physical Activity Guidelines for Americans of at least 60 minutes of moderate-to-vigorous physical activity per day on at least 5 days per week[41,42]. A decline in physical activity at school and after school is one of the contributors to the obesity epidemic[42–44]. In 1969, approximately 48% of school-aged children walked or biked to school versus only 13% in 2009[45]. Schools are decreasing physical education (PE) programs or reducing the time children spend in PE classes[43]. Children who are inactive tend to become inactive adults. Adequate levels of physical activity during childhood, which may persist in adulthood, can decrease the chance of developing chronic diseases such as type 2 diabetes[42,46] and heart disease as an adult[43]. One of the reasons for inactivity among children and adolescents is screen time based on television, video games, and internet use[47]. Childhood obesity is associated with time spent watching television[48,49]. According to NHANES data (2009-2010), U.S. children between 6 and 11 years spent almost 6 hours per day in sedentary activities such as watching television and using electronic devises with screens[50].

Snacking while watching television is of concern because most children are not aware of how much they consume while watching television[51]. Watching television and being exposed to marketing and advertisements geared toward youth may increase fast food and snack intakes[52]. Harris, Bargh & Brownell[51] found that elementary-school-aged children (n=118) consumed 45% more snack foods while watching food advertising than other children who watched other types of advertising. Also, adults consumed more snack

foods (healthy and unhealthy) when exposed to food advertising in comparison with other conditions[51]. Emond et al.[53] found that sugar sweetened beverages (SSBs) were the second highest promoted item to parents on television from 2012 to 2013. These results are disturbing because parents may consider SSBs, such as fruit drinks, healthy choices for their children[54,55].

2. Dietary intake

a. Energy balance-related behaviors

Recent research and literature reviews suggested that the high consumption of SSBs and low intake of fruits and vegetables are energy balance-related behaviors related to obesity[56–58]. Fruit and vegetable intakes are considered important factors for energy balance because of their high water and fiber content, and low calorie content. However, between 2007 and 2010, U.S. children (1-18 years) did not meet the recommendations for fruit and vegetable intake based on the U.S. Department of Agriculture report of food patterns[59]. Mixed results were observed in four longitudinal studies that examined relationships between the intake of fruits and vegetables and adiposity[60]. Chinese overweight children (6-13 years) who had high intake of fruits and vegetables had a lower chance of remaining overweight after a two-year follow-up compared to overweight children with lower intake of fruit and vegetables[61]. Results from another study in U.S. children and adolescents (9–14 years) showed an inverse association between vegetable intake and BMI z-score among boys only, without adjustment for energy intake[62]. After adjusting for energy intake, this relationship did not remain. Two studies were conducted among low-income pre-school children in the U.S. to examine associations between fruit and vegetable intake and adiposity [63,64] . One study did not find

an association [63], whereas the other only found a positive association between adiposity and vegetable intake[64].

Intake of SSBs has been identified as an energy balance-related behavior with intake associated with weight gain among children and adolescents in the U.S. [65]. The beverages considered SSBs are categorized differently in studies regarding intake and effects of intake. The Centers for Diseases Control and Prevention (CDC) defines SSBs as drinks with added sugar such as regular sodas, fruit drinks (not 100% juice), and punches[66].

b. Intake patterns

Snack consumption in the US is typically based on intake of high calorie foods, representing a high proportion of daily calories. Most of the snacks that children eat are energy-dense food items. Nationally representative dietary intake data for children collected from 1989-91 to 1994-98 to 2003-06 by Piernas and Popkin[67] showed that children consumed three snacks per day, accounting for more than 27% of children's total energy intake. In addition, the major sources of calories from snacks for children were salty snacks and candies, desserts and SSBs[67]. Intake of unhealthy snacks such as, regular soda, cookies, ice cream, candies, and chips contributed to the increase in total energy intake which can be linked to an increased risk of obesity[67].

II. Child beverage intake

A. Sugar sweetened beverages

1. Intake

Data from nationally representative surveys (Continuing Survey of Food Intake by Individuals 1989-1991, NHANES 2005-2006, and NHANES 2007-2008) showed that calories from SSBs among children (6-11 years old) have increased significantly from 130 to 210 kcal/day and the percentage of children drinking these beverages increased from 79% to 91% over about 30 years[68]. The percentage of added sugars in the American diet for children and adolescents ages 2 years and older from beverages was 47%, according to What We Eat in America, NHANES data 2009-2010. Of the 47%, 39% of added sugars came from SSBs[65]. The NHANES has assessed beverage intake trends in children from birth to 5 years across three decades[69]. At least 30% of children <1–5 years of age consumed soft drinks on any given day based on these data. Greater consumption of soft drinks was related to greater age[69].

Recent data showed a decline in SSB consumption among children and adolescents. Intake of SSBs by preschool children fell from 2003-2012 based on NHANES data by 57 kcal/day[3]. Trends in SSB intake from NHANES data from 1999 to 2010 indicated that SSB intake by youth (2-19 yrs) decreased by 68 kcal/day based on intake in the home, away from home, and with both meals and snacks[70]. Another study examined trends in SSB consumption for children and adolescents (2–5, 6–11 and 12–17 years) based on the biennial California Health Interview Survey involving 3 separate cross-sectional samples

(2003, 2005, and 2007)[71]. From 2003 to 2007, a significant decline was observed in SSB consumption (% consuming 1 or more soda or sugary drinks/per day) among the 3 groups. Consumption decreased from 16% to 5% for young children (2-5 yrs), from 23% to 10% for children (6-11 yrs), and from 36% to 26% for adolescents (12-17 yrs). In Los Angeles County, intake of SSBs for children and adolescents (under 17 years) was reported from 2007 and 2011 by Simon et al.[4]. The percentage of children and adolescents who consumed 1 or more SSB/day decreased significantly from 43% (2007) to 39% (2011). Although results from these studies highlight a recent decline in SSB consumption among children and adolescents, SSB intake is still high and of concern. The percentage of added sugars in the diet is above the Dietary Guidelines for Americans (2015-2020) recommendations of less than 10% of calories/day from added sugars. SSBs account for a substantial proportion of added sugars in the diet.

2. Relationship to health, disease, and weight

Cardiovascular disease is a health risk that has been associated with obesity [72,73]. Obesity and cardiovascular disease risk factors have been linked to greater consumption of SSBs among children and adolescents[74-76]. Associations between SSB consumption and cardiometabolic markers were examined in children aged 3 to 11 years (4,880 children) based on a nationally representative NHANES dataset (1999 – 2004)[74]. Findings showed a positive and independent association between increased intake of SSBs and higher C-reactive protein concentration, greater waist circumference, and lower high-density lipoprotein cholesterol in young children. Another recent study investigated the relationship between SSB intake and cardiometabolic risks among Asian adolescents (aged 13 years)[75]. Adolescents' average SSB intake in this study was 177.5 ml/day with

significant inverse trends observed between SSB intake and low-density lipoprotein cholesterol and blood pressure[75].

Negative diet quality in children was linked with beverage consumption patterns that are high in sugars, such as soda[77-79]. Fiorito et al.[79] evaluated effects of consuming sweetened carbonated beverages (soda) on intake of other types of beverages and nutrients in girls 5-15 years of age. Girls who consumed soda at age 5 had lower intake of milk and higher intake of soda vs. girls who did not consume soda. Also, soda consumers had greater consumption of added sugars and lower intakes of protein, fiber, vitamin D, calcium, magnesium, potassium, and phosphorous. These patterns of nutrient intake were similar in girls 5-15 years old who consumed soda. Another study[78] examined dietary intake in US households using NHANES 2003-2010 data, which included adults and children (2-18 years). Children consumed 1.58 ± 0.04 servings/day of calorie-sweetened beverages. Children who consumed calorie-sweetened beverages had higher total calorie intake from foods, and higher energy intake from protein, total fat, and saturated fatty acids compared with children not consuming calorie-sweetened beverages. Findings showed that households buying any kind of sweetened beverages were more likely to have poor dietary intake habits.

The type of carbohydrate, solid or liquid, is a key element that could influence the satiety process and subsequent energy intake. Recent data suggest that solid carbohydrates contributed to greater satiety than liquid forms[80]. Therefore, high consumption of SSBs among children could increase consumption of other foods. For example, children aged

6-11 years old who consumed SSBs had higher food intake (+ 342 ± 51 kcal) in comparison with non-consumers[81].

Most of the research on sugar-sweetened beverage intake among adolescents has focused on a potential relationship with obesity[82]. Two longitudinal studies found a positive association between the intake of sugar-sweetened beverages and increased weight or BMI among adolescents[83,84]. The first study observed girls (black and white) for 10 years who were between the ages of 9-10 years at baseline[85]. Consumption of regular soda was associated with a significant increase in BMI. The second study was a 3-year prospective cohort study that included boys and girls (n > 10,000) who were 9-14 years old at enrollment. Children of both genders who increased their intake of SSBs by 2 or more servings/day over a year had significant weight gain compared to those who did not[83]. Another study assessed beverage patterns among children (2-11 years) by using 24-hour diet recalls from NHANES (2001-2002) data[77]. A positive relationship between beverage patterns and BMI were observed in school-aged children, but not in preschool children. A study by de Ruyter and colleagues[86] examined the effects of consuming SSBs regularly on weight gain among children 4-11 years old. Children randomly received one can per day at school of either a sugar-sweetened noncarbonated beverage or a noncaloric, artificially-sweetened, noncarbonated beverage. Normal weight children who received noncaloric beverages had less weight gain and fat mass increases vs. children who consumed SSBs[86]. These results were not consistent with results from a study on the intake of multiple beverages in relation to obesity among preschool children (2-5 years old) who were enrolled in the Special Supplemental Nutrition Program for Women,

Infants, and Children (WIC)[83]. Intakes of milk, fruit juice, fruit drinks, soda, and diet soda were examined. No association was observed between beverage intake and changes in weight and BMI in preschool children. Milk and fruit juice were consumed at a high level and fruit drinks, soda, and diet soda were consumed at a low level possibly because WIC does not provide vouchers for SSBs. Therefore, low consumption of SSBs may have inhibited the ability to identify a relationship between sweetened-beverage consumption and changes in weight and BMI in preschool-aged children.

Few studies have focused on the impact of early beverage patterns on adiposity in children and adolescents. Fiorito and colleagues[79] investigated the effects of beverage intake of girls at age 5 on adiposity, energy intake, and weight status within childhood and adolescence. Girls at age 5 who were consuming sweetened beverages, not including milk or fruit juice, had higher adiposity from age 5 to 15 years. During childhood and adolescence, higher BMI, percentage body fat, and waist circumference were significantly associated with greater intake of sweetened beverages at age 5. From these findings, the authors indicated that early SSB intake can predict weight status and adiposity in childhood and adolescence[79].

B. Dairy beverage intake

1. Intake

Milk and other dairy products are important sources of micronutrients such as calcium, magnesium, zinc, potassium, phosphorus, iodine, vitamin D, vitamin A, vitamin B_{12}, and riboflavin which are important for childhood growth and development[87,88]. Data from 1977 to 2001 showed that intake of dairy beverages, such as milk, has decreased among

children and adolescents[89]. Recent data from the 2007–2015 national Youth Risk Behavior Surveys showed a decrease in daily milk intake during 2011-2015 from 44.3% to 37.4% of those reporting intake[90]. The 2015-2020 Dietary Guidelines for Americans for dairy foods for children (2-18 years old) is two to three servings a day[91]. Based on NHANES 2007-2010 data, many U.S. adolescents (9-18 years) do not meet the Dietary Guidelines recommendations for dairy food intake (99% of girls and 78% of boys)[65]. Beverage intakes among girls in the US (n=2,371) were monitored from 9-10 years to 19 years with results showing a steady trend of decreased milk intake and increased soda intake[85]. Similar results were seen among girls and boys[92]. Dairy foods play an important role as a source of calcium among children[93], therefore the trend of decreased milk intake may lead to an increase in the number of children not meeting calcium requirements.

2. Relationship between dairy product intake and diet quality, health, disease, and weight

Beverage consumption patterns that are high in sugars and low in dairy were linked to negative diet quality in children[76]. A review of 11 observational studies showed an inverse association between intake of milk and/or dairy products among children and adolescents and dental caries[87]. In addition, intake of dairy products including milk has been positively associated with bone health. A review of seven intervention studies that increased dairy product intake from 10 months to 2 years showed a significant improvement in bone mineral content among children (5-15 years)[87]. Associations between blood pressure in children and dairy product intake were investigated in two prospective cohort studies. These studies found that high intake of dairy products among young children (18-59 months) resulted in low blood pressure during middle childhood[94]

or early adolescence[95]. Mixed results were observed for the relationship between the intake of dairy products and body weight among children. However, most prospective and cross-sectional studies showed a beneficial relationship between dairy and/or calcium consumption and weight among children and adolescents[96]. For instance, the intake of calcium among children (7-10 years) was inversely associated with BMI[97]. Another study found that African American girls (11–18 years) who had low intakes of calcium (< 314 mg/day) had higher percent fat mass compared to girls with the highest intakes of calcium (≥ 634 mg/day)[98].

III. Parents' influence on child beverage intake

Parents exert a strong influence on dietary intake of children based on the example they provide, the foods and beverages they make available at home, the rules or expectations they have for what their children eat or drink, and the advice they impart[6,7]. However, the influence of parenting practices and knowledge regarding beverages on beverage intake among early adolescents needs to be further explored. A better understanding of this influence is important based on the lack of information about parental beverage knowledge[99] and the need to address beverage decision making during the critical developmental period of early adolescence.

A. Role modeling

Role modeling, or the transfer of behaviors by social relations, is a key mechanism highly recommended in obesity interventions[100,101]. Poor nutrition among children was related to beverage intake patterns that are low in dairy and high in sugars[77,78]. Vereecken,

Keukelier, & Maes[102] examined the influence of several food practices of mothers on the food consumption of their preschool children (2.5-7 years) including the avoidance of negative modeling behavior (i.e., no intake of soft drinks in the presence of their children). A negative correlation was observed between child soft drink consumption and parental avoidance of negative modeling behavior[102]. Another study found that 73% of adolescents consumed at least one soda per day when their parents consumed one or more sodas daily compared to 53% whose parents did not drink soda[103]. Based on child report, Grimm, Harnack, and Story [104] found that parents who regularly consume soft drinks were nearly three times more likely to have children (8-13 years old) who consume soft drinks five or more times per week in comparison with children whose parents did not consume soft drinks on a regular basis[104]. Parents' intake of dairy foods was associated with dairy intake among children and adolescents[105–107]. Infrequent dairy intake by parents negatively affected child milk intake patterns[105,108]. When mothers consumed milk more frequently their daughters (5 years) also consumed milk more frequently and consumed less soft drinks[108]. Moreover, soft drink intake for mothers and their daughters was inversely correlated to milk and calcium intake[108].

B. Availability

Parental intake and household availability of SSBs have been identified as predictors of SSB consumption by children[109,110]. Harris & Ramsey[111] found that SSB intake by African American fathers and household availability of SSBs significantly predicted SSB intake by children. Ezendam et al.[112] examined the home environment (availability and family food rules) as a predictor of change in SSB intake using longitudinal data from Dutch adolescents. This study was unique in the use of longitudinal data. Low home

availability and stricter family food rules related to consuming SSBs were linked to a decrease in SSB intake between baseline and 4-months follow-up[112]. Availability of milk at meals was positively associated with intake among female adolescents[99]. Another study found that dairy intake among Serbian school aged children was affected by parent reinforcement[113]. The availability of SSBs at home may decrease children's intake from milk, which suggest that SSBs displace milk consumption[85,114–116].

Health behaviors such as unhealthy eating have been explained by socio-cognitive models where environmental factors, such as the availability of foods in the physical environment, or expectations of parents as a component of the social environment, can affect food choice or dietary intake [117]. Family social environments have been shown to influence a number of weight-related behaviors related to eating patterns [118]. Within the family social environment, parents play an essential role that impacts adolescents' food beliefs and behaviors[119]. A cross-sectional study by Conlon et al.[120] examined the role of parenting practices and the home environment among Hispanic/Latino overweight and obese children (7-12 years old). Parent monitoring was inversely associated with SSB availability. Moreover, parent limit setting of soda was negatively related to SSB availability[120]. Parent responses to beverage choices made by adolescents were examined by Riebl et al.[121] using the Theory of Planned Behavior[122], which considers attitudes, norms, perceived behavioral control and intention as precursors to behavior. Results showed that parents significantly discouraged their children from consuming SSBs at home more than encouraging consumption of non SSBs. On the other hand, parents' reactions were more encouraging of non SSBs than discouraging of SSBs out of the

home[121]. Another study that examined influences on parent purchasing behavior (n=2,381) involved reactions to randomly-assigned health warning labels[123]. Three label conditions were developed: 1) a control group with no label, 2) a calorie label, and 3) warning labels regarding contribution of SSBs to obesity or weight gain, diabetes, and tooth decay. Results showed that 40% of parents in the warning label conditions chose SSBs for their child compared with 60% of parents in the control group with no label, and 53% of parents in the calorie label condition.

The family physical and social environment is influenced by demographics factors, such as education, socio-economic status, and occupation. Several studies have shown that education level influences the initiation of healthy behaviors to establish healthy lifestyles[125-127]. Therefore, the education level of parents may be an important factor in helping youth establish healthy eating behaviors and lifestyles. Studies have suggested that people with better education tend to have the essential health information, knowledge, skills, values, and psychological control in order to choose healthy behaviors to establish healthy lifestyles[128]. Nutrition knowledge has also been associated with eating behaviors for adults and adolescents[129-130]. The differences in nutrition knowledge were significant between socio-demographic groups[131]. In addition, men had poor knowledge compared with women, and knowledge was lower in those with lower socio-economic status and lower educational level[129].

Studies that have investigated the relationship between parental knowledge and SSB intake are limited. Park, Onufrak, Perry and Blanck[132] examined the association between

health-related knowledge and SSB consumption among adults. Results showed that adults' SSB consumption was significantly associated with knowledge about SSBs[132]. Similar results were found in a study that evaluated nutritional knowledge and food intake among Italian children and adolescents (4-16 years old)[133]. Nutrition knowledge was negatively related to intake of sugary drinks. High parent educational and occupational levels were significantly associated with lower child and adolescent sugary drink consumption (B = -0.438)[133]. Another study found that parental nutrition knowledge (including knowledge about SSBs) was a significant predictor of Norwegian adolescents' nutrition knowledge[134]. However, SSB intake among adolescents was not significantly related to either parents' or adolescents' knowledge scores. In addition, some parents have misperceptions that sugary drinks, specifically sport drinks, fruit drinks, and flavored waters, are healthier options for their children[55].

IV. Intervention strategies to improve beverage intake of children

A. Previous interventions to improve beverage intake

Several interventions among children evaluated the effects of decreasing SSB consumption on body weight[5]. Studies were primarily school-based education programs and those that replaced SSBs in the home with artificially sweetened or non-caloric beverages[5]. Ebbeling et al.[135] conducted a 1-year intervention with overweight or obese adolescents to decrease intake of SSBs by replacing SSBs with non-caloric beverages. Non-caloric beverages, such as bottled water and diet beverages, were delivered to homes of intervention group participants but not to the homes of the control group participants.

After the intervention, the intervention group had almost eliminated their intake of SSBs, and had a smaller increase in BMI compared to the control group. After an additional year without the intervention, the intervention group also had a lower SSB intake compared to the control group[135]. Another study assessed the feasibility of a home environment intervention to decrease SSB consumption among low-income families with overweight children (5-12 years)[136]. Researchers delivered non-caloric beverages to homes of children in the intervention group for 6 months including flavored and unflavored water, still and sparkling waters, artificially-sweetened water, and unsweetened teas. SSB consumption was lower in the intervention group than the control group (0.21 [SE = .09] vs. 0.45 [SE = .10], respectively, $P < .09$), however, the difference was not statistically significant.

Some school-based interventions have shown positive results. For example Lien et al.[137] conducted a multi-component 20-month school-based intervention that aimed to increase fruit and vegetable intake and total physical activity and decrease SSB intake and screen time among adolescents 11-13 years. Results showed a lower intake of sugar-sweetened fruit drinks in the intervention group in comparison with the control group[131]. A controlled trial[138] used a "water campaign" in four schools among Dutch children (6-12 years) and their parents. The intervention included lessons at the school and community activities for children and their parents to decrease children's SSB intake by promoting water intake. Children in the intervention group had a lower average SSB intake and fewer SSB servings than the control group[138]. A systematic review and meta-analysis by Vargas-Garcia et al.[139] examined behavior change techniques used in 28 interventions to

reduce SSB intake among children and adolescents and only found one study[140] that targeted adolescents and their parents together. This study provided guidelines about food availability in the household and promoted behavioral changes through in-person group meetings, telephone calls, and monthly newsletters. The intervention resulted in adolescents in the intervention group having greater fruit and vegetable intakes than the control group and a decreased intake among parents in the intervention compared to the control group from SSBs, snacks, and sweets [140]. Vargas-Garcia et al.[139] found that the "model/demonstrate the behavior" behavior change technique was effective in reducing SSB in children.

B. Strategies used in prevention programs

Previous interventions to reduce SSB intake among children have focused on activities that involve children, such as school-based curricula or home replacement strategies[5,134,136,137]. Another approach is to focus on parenting practices to decrease SSB intake by children. For instance, several parenting practices such as role modeling and controlling home availability can be used to promote the same healthy dietary behavior of reducing SSB intake by children[141]. Strategies are needed to involve parents in interventions to reduce SSB intake by children and improve motivation to engage in these practices. One strategy is to deliver motivational messages via intervention channels such as in-person classes or through less direct print or online media approaches.

1. Gain vs. loss- framed messages

Message framing is a common method used in health communication to promote or motivate health behavior change[142]. Studies on the effects of message framing for diet

and nutrition behaviors are limited. The few studies examining the effectiveness of gain (positive) and loss (negative) framed messages showed variability in impact, based on the type of behavior[143]. For instance, gain-framed messages were shown to be more effective on prevention behaviors such as physical activity and eating healthy foods than detection behaviors. On the other hand, loss-framed messages were more effective on early detection or prevention of a medical condition such as breast self-exams and screening mammography. For nutrition messages, gain-framed messages were rated more positively than loss-framed messages[144-146]. The few studies that have examined the effectiveness of gain- vs. loss-framed messages on nutrition behaviors were conducted to improve fruit and vegetable intake by children or adolescents[144,145] or perceptions of diabetic education among adults[146]. For example, 57% of children chose to eat apples for a snack instead of animal crackers after watching a video (gain-framed nutrition message about benefits of eating apples) compared to 33% of control children (video about children playing a game)[144]. For African American adolescents (12-16 years), gain-framed (short-term) messages were most salient for fruits and/or vegetables compared with other message types[145]. Hispanic adults rated gain-framed messages about diet and diabetes more positively than loss-framed messages[146]. However, loss-framed messages were more engaging with stronger intention to eat healthy and/or become physically active.

Studies are more limited on effects of message framing for parenting practices that focus on the health of someone other than the person receiving the message. Limited studies have also addressed the effectiveness of gain- vs. loss-framed messages for different

behaviors that could produce the same outcome[147]. In addition, studies that examine the effects of various dispositional factors on gain- vs. loss-framed nutrition messages are limited[143]. A recent review showed that gain-framed messages were more effective when the behavior helped individuals avoid risk, the outcome of the behavior was certain, and individuals had a low level of involvement or interest in the issue[143], however, few studies were focused on diet or nutrition-related outcomes. Reactions to gain- vs. loss-framed messages to motivate the frequency of parenting practices may reflect dispositional factors such as self-efficacy beliefs, level of involvement, or risk aversion. The limited number of studies that tested message framing to promote healthy dietary behaviors supported the effectiveness of gain- vs. loss-framed messaging but few studies examined the effects of various dispositional factors [145,146,148,149]. In addition, changing dietary behaviors via message framing mostly focused on messages that aimed to modify behaviors of the person receiving the message [144-146] rather than as a proxy for another person.

2. Newsletters and text messages

Newsletters have been used along with other intervention strategies to change nutrition-related behaviors, knowledge, and attitudes among adults[150-153]. These results highlight the potential role for newsletters as a part of parent education programs to promote parental practices that encourage positive changes in child beverage consumption at home. Messages for parents can be embedded in intervention materials available in print and/or electronic format including newsletters. A recent systematic review and meta-analysis[139] found that home-based interventions were more effective in decreasing SSB consumption among children and adolescents versus school-based interventions. In

addition, one of the most common behavior change techniques used among the intervention groups was providing information about the consequences of engaging or not engaging in the behavior[139]. For example, in the case of SSB consumption, information could be provided on the consequences of heavy consumption of SSBs via newsletters and text messages. Newsletters and text messages are considered a cost-effective method to deliver nutrition information.

Several studies have reported the use of parent newsletters in conjunction with other intervention strategies to change parent behaviors[145-156]. For example, in a 6-month school-based intervention trial, parent newsletters were used to encourage parents to help children change sedentary behavior[157]. Results showed that children in the intervention groups spent less time watching TV and playing computer/videogames compared to the control group. A review of interventions in child-care settings identified educational newsletters that targeted parents as a strategy to improve nutrition outcomes in children[154]. Newsletters were used in a nutrition education program designed for low-income families in 24 child-care centers to increase fruit and vegetable consumption among children and to encourage children to drink low-fat/fat-free milk instead of whole milk[155]. The intervention included 6 newsletters that were distributed to parents weekly. Fifty-two percent of parents reported reading all or most of the newsletters. The program showed a significant increase in vegetable intake and the use of low-fat/fat-free milk at home among children. Parental newsletters were also used to promote accessibility and home availability of fruits and vegetables. Children whose parents reported the highest

usage of the newsletters had higher fruit and vegetable intakes compared to children whose parents had the lowest usage at 8 and 20 months follow-up[156].

V. References (Chapter 1 and 2)

1. Mesirow MS, Welsh JA. Changing beverage consumption patterns have resulted in fewer liquid calories in the diets of US children: National Health and Nutrition Examination Survey 2001–2010.. *J. Acad. Nutr. Diet*. 2015; 115:559–66.e4.
2. Han E, Powell L. Consumption patterns of sugar-sweetened beverages in the United States. *J Acad Nutr Diet*. 2013; 113(1):43-53.
3. Ford CN, Ng SW, Popkin BM. Ten-year beverage intake trends among US preschool children: rapid declines between 2003 and 2010 but stagnancy in recent years. *Pediatr Obes*. 2016;11(1):47-53. doi:10.1111/ijpo.12019.
4. Simon P, Lightstone A, Baldwin S, Kuo T. Peer Reviewed: Declines in sugar-sweetened beverage consumption among children in Los Angeles County, 2007 and 2011. *Prev Chronic Dis*. 2013;10E131.
5. Malik VSV, Pan A, Willett WC, Hu FBF. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *Am J Clin Nutr*. 2013;98(4):1084-1102. doi:10.3945/ajcn.113.058362.
6. Santiago-Torres M, Adams A, Carrel A. Home food availability, parental dietary intake, and familial eating habits influence the diet quality of urban Hispanic children. *Childhood Obes*. 2014;10(5):408-415.
7. Wyse R, Campbell E, Nathan N. Associations between characteristics of the home food environment and fruit and vegetable intake in preschool children: a cross-sectional study. *BMC Public Health*. 2011;11:938.
8. Centers for Disease Control and Prevention. Defining Childhood Obesity | Overweight & Obesity | CDC.

https://www.cdc.gov/obesity/childhood/defining.html. Published 2016.

9. Ogden C, Carroll M FC& FK. Prevalence of obesity among adults and youth: United States, 2011-2014. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. http://c.ymcdn.com/sites/www.acutept.org/resource/resmgr/Critical_EdgEmail/0216-prevalence-of-obesity.pdf. Published 2015.
10. Minnesota Center for Health Statistics. Minnesota Student Survey. http://www.health.state.mn.us/divs/chs/mss/. Published 2016.
11. Ogden CL, Carroll MD, Lawman HG, et al. Trends in obesity prevalence among children and adolescents in the United States, 1988-1994 through 2013-2014. *JAMA*. 2016;315(21):2292-2299. doi:10.1001/jama.2016.6361.
12. Gurnani M, Birken C, Hamilton J. Childhood obesity: causes, consequences, and management. *Pediatr Clin North Am*. 2015; 62(4):821-40. doi: 10.1016/j.pcl.2015.04.001.
13. Cawley J, Meyerhoefer C. The medical care costs of obesity: An instrumental variables approach. *J Health Econ*. 2012;31(1):219-230. doi:10.1016/j.jhealeco.2011.10.003.
14. Kelsey MM, Zaepfel A, Bjornstad P, Nadeau KJ. Age-related consequences of childhood obesity. *Gerontology*. 2014;60(3):222-228. doi:10.1159/000356023.
15. Nicolino M, Villanueva C. What is the risk for childhood obesity? *Rev Prat.* 2015; 65(1):1275-7..
16. Kaufman FR. Type 2 diabetes mellitus in children and youth: a new epidemic. *J Pediatr Endocrinol Metab*. 2002;15(Supplement):737-744.

doi:10.1515/JPEM.2002.15.S2.737.

17. Sorof J, Daniels S. Obesity hypertension in children. *Hypertension*. 2002;40(4).

18. Marcovecchio M, Chiarelli F, Mohn A. Blood pressure and childhood obesity. *Curr Hypertens Rev*. 2009;5(4):313-320. doi:10.2174/157340209789587735.

19. Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. Risk factors and adult body mass index among overweight children: The Bogalusa Heart Study. *Pediatrics*. 2009;123(3):750-7.

20. Biro FM, Wien M. Childhood obesity and adult morbidities. *Am J Clin Nutr*. 2010;91(1):1499-1505. doi:10.3945/ajcn.2010.28701B.1.

21. Michels KB, Mohllajee AP, Roset-Bahmanyar E, Beehler GP, Moysich KB. Diet and breast cancer. *Cancer*. 2007;109(S12):2712-2749. doi:10.1002/cncr.22654.

22. Rose DP, Komninou D, Stephenson GD. Obesity, adipocytokines, and insulin resistance in breast cancer. *Obes Rev*. 2004;5(3):153-165. doi:10.1111/j.1467-789X.2004.00142.x.

23. Lorincz AM, Sukumar S. Molecular links between obesity and breast cancer. *Endocr Relat Cancer*. 2006;13(2):279-292. doi:10.1677/erc.1.00729.

24. Jeffreys M, Davey Smith G, Martin RM, Frankel S, Gunnell D. Childhood body mass index and later cancer risk: A 50-year follow-up of the Boyd Orr study. *Int J Cancer*. 2004;112(2):348-351. doi:10.1002/ijc.20423.

25. Bjorge T, Engeland A, Tverdal A, Smith GD. Body mass index in adolescence in relation to cause-specific mortality: a follow-up of 230,000 Norwegian adolescents. *Am J Epidemiol*. 2008;168(1):30-37. doi:10.1093/aje/kwn096.

26. de Sousa AGP, Cercato C, Mancini MC, Halpern A. Obesity and obstructive sleep

apnea-hypopnea syndrome. *Obes Rev*. 2008;9(4):340-354. doi:10.1111/j.1467-789X.2008.00478.x.

27. Niehoff V. Childhood obesity: A call to action. *Bariatric Nurs Surgical Patient Care*. 2009;4:17–23.

28. Körner A, Kratzsch J, Gausche R, et al. Metabolic syndrome in children and adolescents – risk for sleep-disordered breathing and obstructive sleep-apnoea syndrome? *Arch Physiol Biochem*. 2008;114(4):237-243. doi:10.1080/13813450802306685.

29. Wolk R, Somers VK. Obesity-related cardiovascular disease: implications of obstructive sleep apnea. *Diabetes, Obes Metab*. 2006;8(3):250-260. doi:10.1111/j.1463-1326.2005.00508.x.

30. Harrist AW, Topham GL, Hubbs-Tait L, Page MC, Kennedy TS, Shriver LH. What developmental science can contribute to a transdisciplinary understanding of childhood obesity: an interpersonal and intrapersonal risk model. *Child Dev Perspect*. 2012;6(4):445-455. doi:10.1111/cdep.12004.

31. Gullotta T P, Ma M, Gullotta TP, Blau GM. *Handbook of childhood behavioral issues: evidence-based approaches to prevention and treatment*.New York; Routledge;2008.

32. Gray WN, Kahhan NA, Janicke DM. Peer victimization and pediatric obesity: A review of the literature. *Psychol Sch*. 2009;46(8):720-727. doi:10.1002/pits.20410.

33. Saylor CF, Williams KD, Nida SA, McKenna ME, Twomey KE, Macias MM. Ostracism in pediatric populations. *J Dev Behav Pediatr*. 2013;34(4):279-287. doi:10.1097/DBP.0b013e3182874127.

34. van den Berg P, Neumark-Sztainer D, Eisenberg ME, Haines J. Racial/ethnic differences in weight-related teasing in adolescents. *Obesity*. 2008;16(S2):S3-S10. doi:10.1038/oby.2008.445.

35. Harrist AW, Swindle TM, Hubbs-Tait L, Topham GL, Shriver LH, Page MC. The Social and emotional lives of overweight, obese, and severely obese children. *Child Dev*. 2016;87(5):1564-1580. doi:10.1111/cdev.12548.

36. Hill AJ. Obesity in children and the 'myth of psychological maladjustment': self-esteem in the spotlight. *Curr Obes Rep*. 2017;6(1):63-70. .

37. Summerbell CD, Douthwaite W, Whittaker V, Ells LJ, Hillier F, Smith S, Kelly S, Edmunds LD MI. The association between diet and physical activity and subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence. *Int J Obes*. 2009;33:S1-92. doi:10.1038/ijo.2009.80.

38. Jiménez-Pavón D, Kelly J, Reilly JJ. Associations between objectively measured habitual physical activity and adiposity in children and adolescents: Systematic review. *Int J Pediatr Obes*. 2010;5(1):3-18. doi:10.3109/17477160903067601.

39. Moreno LA, Rodríguez G. Dietary risk factors for development of childhood obesity. *Curr Opin Clin Nutr Metab Care*. 2007;10(3):336-341. doi:10.1097/MCO.0b013e3280a94f59.

40. Rey-López JP, Vicente-Rodríguez G, Biosca M, Moreno LA. Sedentary behaviour and obesity development in children and adolescents. *Nutr Metab Cardiovasc Dis*. 2008;18(3):242-251. doi:10.1016/j.numecd.2007.07.008.

41. Troiano RP, Berrigani D, Dodd KW, Masse LC, Tilert T, Mcdowell M. Physical

activity in the United States measured by accelerometer. *Med Sci Sport Exerc*. 2008;40(1):181-188.

42. US Department of Health and Human Service. Physical Activity Guidelines Advisory Committee report. Washington, DC: US Department of Health and Human Services. https://health.gov/paguidelines/pdf/paguide.pdf. Published 2008.

43. Loprinzi PD, Lee I-M, Andersen RE, Crespo CJ, Smit E. Association of concurrent healthy eating and regular physical activity with cardiovascular disease risk factors in U.S. youth. *Am J Health Promot*. 2015;30(1):2-8. doi:10.4278/ajhp.140213-QUAN-71.

44. Cuenca-García M, Ortega FB, Ruiz JR, et al. Combined influence of healthy diet and active lifestyle on cardiovascular disease risk factors in adolescents. *Scand J Med Sci Sports*. 2014;24(3):553-562. doi:10.1111/sms.12022.

45. McDonald NC, Brown AL, Marchetti LM, Pedroso MS. U.S. school travel, 2009. *Am J Prev Med*. 2011;41(2):146-151. doi:10.1016/j.amepre.2011.04.006.

46. Kriska A, Delahanty L, Edelstein S, et al. Sedentary behavior and physical activity in youth with recent onset of type 2 diabetes. *Pediatrics*. 2013;131(3) e850-e856.

47. Fakhouri THI, Hughes JP, Brody DJ, Kit BK, Ogden CL. Physical activity and screen-time viewing among elementary school–aged children in the United States from 2009 to 2010. *JAMA Pediatr*. 2013;167(3):223. doi:10.1001/2013.jamapediatrics.122.

48. Galson SK. Childhood overweight and obesity prevention. *Public Health Rep*. 2008;123(3):258-259. doi:10.1177/003335490812300302.

49. Sisson SB, Church TS, Martin CK, et al. Profiles of sedentary behavior in children

and adolescents: The US National Health and Nutrition Examination Survey, 2001–2006. *Int J Pediatr Obes*. 2009;4(4):353-359. doi:10.3109/17477160902934777.

50. Belcher BR, Berrigan D, Dodd KW, Emken BA, Chou C-P, Spruijt-Metz D. Physical activity in US youth: effect of race/ethnicity, age, gender, and weight status. *Med Sci Sports Exerc*. 2010;42(12):2211-2221. doi:10.1249/MSS.0b013e3181e1fba9.

51. Harris JL, Bargh JA, Brownell KD. Priming effects of television food advertising on eating behavior. *Health Psychol*. 2009;28(4):404-413. doi:10.1037/a0014399.

52. Chou S-Yi, Rashad I, Grossman M. Fast-food restaurant advertising on television and its influence on childhood obesity. *J Law Econ*. 2008;51(4):599-618.

53. Emond JA, Smith ME, Mathur SJ, Sargent JD, Gilbert-Diamond D. Children's food and beverage promotion on television to parents. *Pediatrics*. 2015; 136(6):1095-102.

54. Hennessy M, Bleakley A, Piotrowski JT, Mallya G, Jordan A. Sugar-sweetened beverage consumption by adult earegivers and their children. *Health Educ Behav*. 2015;42(5):677-686. doi:10.1177/1090198115577379.

55. Munsell C, Harris J, Sarda V. Parents' beliefs about the healthfulness of sugary drink options: opportunities to address misperceptions. *Public Health Nutr*. 2016;19(1):46-54.

56. Brug J, van Stralen MM, Te Velde SJ, et al. Differences in weight status and energy-balance related behaviors among schoolchildren across Europe: the ENERGY-project. *PLoS One*. 2012;7(4):e34742.

doi:10.1371/journal.pone.0034742.

57. Maffeis C. Aetiology of overweight and obesity in children and adolescents. *Eur J Pediatr*. 2000;159 Suppl 1:S35-44.

58. Fernández-Alvira JM, te Velde SJ, De Bourdeaudhuij I, et al. Parental education associations with children's body composition: mediation effects of energy balance-related behaviors within the ENERGY-project. *Int J Behav Nutr Phys Act*. 2013;10:80. doi:10.1186/1479-5868-10-80.

59. Kim SA, Moore L V, Galuska D, et al. Vital signs: fruit and vegetable intake among children - United States, 2003-2010. *MMWR Morb Mortal Wkly Rep*. 2014;63(31):671-676.

60. Ledoux TA, Hingle MD, Baranowski T. Relationship of fruit and vegetable intake with adiposity: a systematic review. *Obes Rev*. 2011;12(5):e143-e150. doi:10.1111/j.1467-789X.2010.00786.x.

61. Wang Y, Ge K, Popkin BM. Why do some overweight children remain overweight, whereas others do not? *Public Health Nutr*. 2003;6(6):549-558.

62. Field AE, Gillman MW, Rosner B, Rockett HR, Colditz GA. Association between fruit and vegetable intake and change in body mass index among a large sample of children and adolescents in the United States. *Int J Obes*. 2003;27(7):821-826. doi:10.1038/sj.ijo.0802297.

63. Faith MS, Dennison BA, Edmunds LS, Stratton HH. Fruit juice intake predicts increased adiposity gain in children from low-income families: weight status-by-environment interaction. *Pediatrics*. 2006;118(5):2066-2075. doi:10.1542/peds.2006-1117.

64. Newby PK, Peterson KE, Berkey CS, Leppert J, Willett WC, Colditz GA. Dietary composition and weight change among low-income preschool children. *Arch Pediatr Adolesc Med*. 2003;157(8):759. doi:10.1001/archpedi.157.8.759.

65. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015–2020 Dietary guidelines for Americans. 8th Edition. December 2015. Available online http://health.gov/dietaryguidelines/2015/guidelines/.

66. Centers for Disease Control and Prevention. Does drinking beverages with added sugars increase the risk of overweight? https://www.cdc.gov/nccdphp/dnpa/nutrition/pdf/r2p_sweetend_beverages.pdf. Published 2006.

67. Piernas C, Popkin BM. Trends in snacking among U.S. children. *Health Aff (Millwood)*. 2010;29(3):398-404. doi:10.1377/hlthaff.2009.0666.

68. Lasater G, Piernas C, Popkin BM. Beverage patterns and trends among school-aged children in the US, 1989-2008. *Nutr J*. 2011;10(1):103. doi:10.1186/1475-2891-10-103.

69. Fulgoni VL, Quann EE. National trends in beverage consumption in children from birth to 5 years: analysis of NHANES across three decades. *Nutr J*. 2012;11(1): 92.

70. Kit, BK., Fakhouri THI, Park S, Nielsen SJ, Ogden CL. Trends in sugar-sweetened beverage consumption among youth and adults in the United States: 1999–2010. *Am J Clin Nutr*. 2013; ajcn-057943.

71. Shi L, van Meijgaard J. Substantial decline in sugar-sweetened beverage consumption among California's children and adolescents. *Int J Gen Med*. 2010;3:221-224.

72. Ahima RS, Lazar MA. The health risk of obesity—better metrics imperative. *Science*. 2013;341(6148):856-858.

73. Berrington de Gonzalez A, Hartge P, Cerhan JR, et al. Body-mass index and mortality among 1.46 million white adults. *N Engl J Med*. 2010;363(23):2211-2219. doi:10.1056/NEJMoa1000367.

74. Kosova E, Auinger P, Bremer A. The relationships between sugar-sweetened beverage intake and cardiometabolic markers in young children. *J Acad NutrDiet*. 2013;113(2):219-227.

75. Loh DA, Moy FM, Zaharan NL, Jalaludin MY, Mohamed Z. Sugar-sweetened beverage intake and its associations with cardiometabolic risks among adolescents. *Pediatr Obes*. 2017;12(1):e1-e5. doi:10.1111/ijpo.12108.

76. Malik VS, Popkin BM, Bray GA, Després J-P, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*. 2010;121(11):1356-1364.

77. LaRowe T, Moeller S, Adams A. Beverage patterns, diet quality, and body mass index of US preschool and school-aged children. *J Am Diet Assoc*. 2007;107(7):1124-33.

78. Piernas C, Mendez MA, Ng SW, Gordon-Larsen P, Popkin BM. Low-calorie- and calorie-sweetened beverages: Diet quality, food intake, and purchase patterns of US household consumers. *Am J Clin Nutr*. 2014;99(3):567-577. doi:10.3945/ajcn.113.072132.

79. Fiorito LM, Marini M, Francis LA, Smiciklas-Wright H, Birch LL. Beverage intake of girls at age 5 y predicts adiposity and weight status in childhood and

adolescence. *Am J Clin Nutr*. 2009;90(4):935-942. doi:10.3945/AJCN.2009.27623.

80. Pan A, Hu FB. Effects of carbohydrates on satiety: differences between liquid and solid food. *Curr Opin Clin Nutr Metab Care*. 2011;14(4):385-390. doi:10.1097/MCO.0b013e328346df36.

81. Mathias KC, Slining MM, Popkin BM. Foods and beverages associated with higher intake of sugar-sweetened neverages. *Am J Prev Med*. 2013;44(4):351-357. doi:10.1016/j.amepre.2012.11.036.

82. Ambrosini GL, Oddy WH, Huang RC, Mori TA, Beilin LJ, Jebb SA. Prospective associations between sugar-sweetened beverage intakes and cardiometabolic risk factors in adolescents. *Am J Clin Nutr*. 2013;98(2):327-334. doi:10.3945/ajcn.112.051383.

83. Newby P, Peterson K, Berkey C, Leppert J. Beverage consumption is not associated with changes in weight and body mass index among low-income preschool children in North Dakota. *J Am Diet Assoc*. 2004;104(7):1086-94.

84. Berkey C, Rockett H, Field A. Sugar-added beverages and adolescent weight change. *Obesity Res*. 2004;12(5):778-88.

85. Striegel-Moore RH, Thompson D, Affenito SG, et al. Correlates of beverage intake in adolescent girls: The National Heart, Lung, and Blood Institute Growth and Health Study. *J Pediatr*. 2006;148(2):183-187. doi:10.1016/j.jpeds.2005.11.025.

86. De Ruyter JC, Olthof MR, Seidell JC, Katan MB. A trial of sugar-free or sugar-sweetened beverages and body weight in children. *N Engl J Med*. 2012;367:1397-1406. doi:10.1056/NEJMoa1203034.

87. Dror DK, Allen LH. Dairy product intake in children and adolescents in developed countries: trends, nutritional contribution, and a review of association with health outcomes. *Nutr Rev*. 2014;72(2):68-81. doi:10.1111/nure.12078..

88. Hoppe C, Mølgaard C, Michaelsen KF. Cow's milk and linear growth in industrialized and developing countries. *Annu Rev Nutr*. 2006;26(1):131-173. doi:10.1146/annurev.nutr.26.010506.103757.

89. Nielsen SJ, Popkin BM. Changes in beverage intake between 1977 and 2001. *Am J Prev Med*. 2004;27(3):205-210. doi:10.1016/j.amepre.2004.05.005.

90. Miller G, Merlo C, Demissie Z, Sliwa S, Park S. Trends in beverage consumption among high school students — United States, 2007–2015. *MMWR Morb Mortal Wkly Rep*. 2017;66(4):112-116. doi:10.15585/mmwr.mm6604a5.

91. Quann E, Fulgoni V, Auestad N. Consuming the daily recommended amounts of dairy products would reduce the prevalence of inadequate micronutrient intakes in the United States: diet modeling study based on NHANES 2007-2010. *Nutr J*. 2015;14(90).

92. Demory-Luce D, Morales M, Nicklas T, Baranowski T, Zakeri I, Berenson G. Changes in food group consumption patterns from childhood to young adulthood: The Bogalusa Heart Study. *J Am Diet Assoc*. 2004;104(11):1684-1691. doi:10.1016/j.jada.2004.07.026.

93. Nicklas TA, O'Neil CE, Fulgoni VL. The role of dairy in meeting the recommendations for shortfall nutrients in the American diet. *J Am Coll Nutr*. 2009;28(sup1):73S-81S. doi:10.1080/07315724.2009.10719807.

94. Rangan AM, Flood VL, Denyer G, et al. The effect of dairy consumption on blood pressure in mid-childhood: CAPS cohort study. *Eur J Clin Nutr*. 2012;66(6):652-657. doi:10.1038/ejcn.2011.218.

95. Moore LL, Singer MR, Bradlee ML, et al. Intake of fruits, vegetables, and dairy products in early childhood and subsequent blood pressure change. *Epidemiology*. 2005;16(1):4-11.

96. Spence LA, Cifelli CJ, Miller GD. The role of dairy products in healthy weight and body composition in children and adolescents. *Curr Nutr Food Sci*. 2011;7(1):40-49. doi:10.2174/157340111794941111.

97. Dixon LB, Pellizzon MA, Jawad AF, Tershakovec AM. Calcium and dairy intake and measures of obesity in hyper- and normocholesterolemic children. *Obes Res*. 2005;13(10):1727-1738. doi:10.1038/oby.2005.211.

98. Tylavsky FA, Cowan PA, Terrell S, Hutson M, Velasquez-Mieyer P. Calcium intake and body composition in African-American children and adolescents at risk for overweight and obesity. *Nutrients*. 2010;2(9):950-964. doi:10.3390/nu2090950.

99. Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. *J Am Diet Assoc*. 2006;106(11):1816-24. doi:10.1016/j.jada.2006.08.018.

100. Summerbell CD, Moore HJ, Vögele C, et al. Evidence-based recommendations for the development of obesity prevention programs targeted at preschool children. *Obes Rev*. 2012;13(s1):129-132. doi:10.1111/j.1467-789X.2011.00940.x.

101. Gibson EL, Kreichauf S, Wildgruber A, et al. A narrative review of psychological and educational strategies applied to young children's eating behaviours aimed at reducing obesity risk. *Obes Rev*. 2012;13(s1):85-95. doi:10.1111/j.1467-789X.2011.00939.x.

102. Vereecken C, Keukelier E, Maes L. Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*. 2004;43(1):93-103.

103. Diamant A, Babey S, Jones M. Teen dietary habits related to those of parents. *Policy Brief UCLA Cent Health Policy Res*. 2009;(PB2009-2):1-6.

104. Grimm G, Harnack L, Story M. Factors associated with soft drink consumption in school-aged children. *J Am Diet Assoc*. 2004;104(8):1244-9.

105. Reicks M, Degeneffe D, Ghosh K, et al. Parent calcium-rich-food practices/perceptions are associated with calcium intake among parents and their early adolescent children. *Public Health Nutr*. 2012;15(2):331-340. doi:10.1017/S1368980011001133.

106. Hanson NI, Neumark-Sztainer D, Eisenberg ME, Story M, Wall M. Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables and dairy foods. *Public Health Nutr*. 2005;8(1):77-85. doi:10.1079/PHN2004661.

107. Arcan C, Neumark-Sztainer D, Hannan P, van den Berg P, Story M, Larson N. Parental eating behaviours, home food environment and adolescent intakes of fruits, vegetables and dairy foods: longitudinal findings from Project EAT. *Public Health Nutr*. 2007;10(11):1257-1265. doi:10.1017/S1368980007687151.

108. Fisher J, Mitchell D, Smiciklas-Wright H, Birch L. Maternal milk consumption predicts the tradeoff between milk and soft drinks in young girls' diets. *J Nutr*. 2001;131(2):246-250.

109. Bauer KW, Neumark-Sztainer D, Fulkerson JA, Hannan PJ, Story M. Familial correlates of adolescent girls' physical activity, television use, dietary intake, weight, and body composition. *Int J Behav Nutr Phys Act*. 2011;8(1):25. doi:10.1186/1479-5868-8-25.

110. Wang L, Dalton WT, Schetzina KE, et al. Home food environment, dietary intake, and weight among overweight and obese children in Southern Appalachia. *South Med J*. 2013;106(10):550-557. doi:10.1097/SMJ.0000000000000008.

111. Harris TS, Ramsey M. Paternal modeling, household availability, and paternal intake as predictors of fruit, vegetable, and sweetened beverage consumption among African American children. *Appetite*. 2015;85:171-177. doi:10.1016/j.appet.2014.11.008.

112. Ezendam N, Evans A, Stigler M. Cognitive and home environmental predictors of change in sugar-sweetened beverage consumption among adolescents. *Br J Nutr*. 2010;103(5):768-74.

113. Šumonja S, Novaković B. Determinants of fruit, vegetable, and dairy consumption in a sample of schoolchildren, Northern Serbia, 2012. *Prev Chronic Dis*. 2013;10:130072. doi:10.5888/pcd10.130072.

114. Keller KL, Kirzner J, Pietrobelli A, St-Onge M-P, Faith MS. Increased sweetened beverage intake is associated with reduced milk and calcium intake in 3- to 7-year-old children at multi-item laboratory lunches. *J Am Diet Assoc*. 2009;109(3):497-

501. doi:10.1016/j.jada.2008.11.030.

115. Lasater G, Piernas C, Popkin BM. Beverage patterns and trends among school-aged children in the US, 1989-2008. *Nutr J*. 2011;10(1):103. doi:10.1186/1475-2891-10-103.

116. Goh DYT, Jacob A. Children's consumption of beverages in Singapore: Knowledge, attitudes and practice. *J Paediatr Child Health*. 2011;47(7):465-472. doi:10.1111/j.1440-1754.2010.01999.x.

117. Conner M, Armitage C. Social psychological models of food choice. *Front Nutr Sci*. 2006;3(41).

118. Hammond R. Social influence and obesity. *Curr Opin Endocrinol Diabetes Obes.* 2010;17 (5), 467-71. doi: 10.1097/MED.0b013e32833d4687

119. Watts A, Mâsse L, Barr S, Lovato C. Parent–child associations in selected food group and nutrient intakes among overweight and obese adolescents. *J Acad Nutr Diet*. 2014;114(1):1580-6.

120. Conlon BBA, McGinn APA, Lounsbury DDW, et al. The role of parenting practices in the home environment among underserved youth. *Child Obes*. 2015; 11(4):394-405. doi:10.1089/chi.2014.0093.

121. Riebl S, MacDougal C, Hill C, Estabrooks P. Beverage choices of adolescents and their parents using the theory of planned behavior: a mixed methods analysis. *J Acad Nutr Diet*. 2016;116(2):226-39.

122. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis*. 1991;50(2):179-211.

123. Roberto C, Wong D, Musicus A, Hammond D. The influence of sugar-sweetened

beverage health warning labels on parents' choices. *Pediatrics*. 2016;137 (2):e20153185. doi: 10.1542/peds.2015-3185.

124. Campbell K, Abbott G, Spence A, Crawford D. Home food availability mediates associations between mothers' nutrition knowledge and child diet. *Appetite*. 2013;71:1-6.

125. McLeod E, Campbell K, Hesketh K. Nutrition knowledge: a mediator between socioeconomic position and diet quality in Australian first-time mothers. *J Am Diet Assoc*. 2011;111(5):696-704.

126. Vereecken C, Maes L. Young children's dietary habits and associations with the mothers' nutritional knowledge and attitudes. *Appetite*. 2010;54(1):44-51.

127. Rosenkranz R. Model of the home food environment pertaining to childhood obesity. *Nutr Rev*. 2008;66(3):123-40.

128. Parmenter K, Waller J, Wardle J. Demographic variation in nutrition knowledge in England. *Health Educ Res*. 2000;15(2):163-174. doi:10.1093/her/15.2.163.

129. Pirouznia M. The association between nutrition knowledge and eating behavior in male and female adolescents in the US. *Int J Food Sci Nutr*. 2001;52(2):127-132. doi:10.1080/09637480020027000-8.

130. Bjelland M, Hausken SES, Bergh IH, et al. Changes in adolescents' and parents' intakes of sugar-sweetened beverages, fruit and vegetables after 20 months: results from the HEIA study – a comprehensive, multi-component school-based randomized trial. *Food Nutr Res*. 2015;59(1):25932. doi:10.3402/fnr.v59.25932.

131. Park S, Onufrak S, Sherry B, Blanck H. The relationship between health-related knowledge and sugar-sweetened beverage intake among US adults. *J Acad Nutr*

Diet. 2014;114(7):1059-66.

132. Grosso G, Mistretta A, Turconi G, Cena H, Roggi C, Galvano F. Nutrition knowledge and other determinants of food intake and lifestyle habits in children and young adolescents living in a rural area of Sicily, South Italy. *Public Health Nutr*. 2013;16(10):1827-1836. doi:10.1017/S1368980012003965.

133. Bjelland M, Hausken S. Development of family and dietary habits questionnaires: the assessment of family processes, dietary habits and adolescents' impulsiveness in Norwegian adolescents and their parents. *Int J Beha Nutr Phys Act.*2014;15(11):130.

134. Ebbeling CB, Feldman HA, Chomitz VR, et al. A randomized trial of sugar-sweetened beverages and adolescent body weight. *N Engl J Med*. 2012;367:1407-1416. doi:10.1056/NEJMoa1203388.

135. French SA, Sherwood NE, JaKa MM, Haapala JL, Ebbeling CB, Ludwig DS. Physical changes in the home environment to reduce television viewing and sugar-sweetened beverage consumption among 5- to 12-year-old children: a randomized pilot study. *Pediatr Obes*. 2016;11(5):e12-e15. doi:10.1111/ijpo.12067.

136. Lien N, Bjelland M, Bergh IH, et al. Design of a 20-month comprehensive, multicomponent school-based randomised trial to promote healthy weight development among 11-13 year olds: The HEalth In Adolescents study. *Scand J Public Health*. 2010;38(5_suppl):38-51. doi:10.1177/1403494810379894.

137. van de Gaar VM, Jansen W, van Grieken A, Borsboom GJJM, Kremers S, Raat H. Effects of an intervention aimed at reducing the intake of sugar-sweetened beverages in primary school children: a controlled trial. *Int J Behav Nutr Phys Act*.

2014;11:98. doi:10.1186/s12966-014-0098-8.

138. Vargas-Garcia EJ, Evans CEL, Prestwich A, Sykes-Muskett BJ, Hooson J, Cade JE. Interventions to reduce consumption of sugar-sweetened beverages or increase water intake: evidence from a systematic review and meta-analysis. *Obes Rev*. July 2017. [Epub ahead of print] doi:10.1111/obr.12580.

139. French SA, Gerlach AF, Mitchell NR, Hannan PJ, Welsh EM. Household obesity prevention: Take Action—a group-randomized trial. *Obesity*. 2011;19(10):2082-2088. doi:10.1038/oby.2010.328.

140. Vaughn AE, Ward DS, Fisher JO, Faith MS, Hughes SO, Kremers SO, Kremers SP, Musher-Eizenman DR, O'Connor TM, Patrick H, Power TG. Fundamental constructs in food parenting practices: a content map to guide future research. *Nutr Rev.* 2016;74(2):98-117. doi:10.1093/nutrit/nuv061.

141. Akl EA, Oxman AD, Herrin J, et al. Framing of health information messages. In: *Cochrane Database of Systematic Reviews*. 2011; (12): CD006777. doi:10.1002/14651858.CD006777.pub2.

142. Wansink B, Pope L. When do gain-framed health messages work better than fear appeals? *Nutr Rev*. 2015;73(1):4-11.

143. Bannon K, Schwartz MMBMMB. Impact of nutrition messages on children's food choice: Pilot study. *Appetite*. 2006;46(2):124-129. doi:10.1016/j.appet.2005.10.009.

144. Satia J, Barlow J, Armstrong-Brown J. A qualitative study to explore Prospect theory and message framing and diet and cancer prevention-related issues among African American adolescents. *Cancer Nurs*. 2010;33(2):102-9.

145. Wirtz J, Kulpavaropas S. The effects of narrative and message framing on engagement and eating intention among a sample of adult Hispanics. *J Nutr Educ Behav*. 2014;46(5):396-400.

146. Gerend MA, Shepherd MA. When different message frames motivate different routes to the same health outcome. *Ann Behav Med*. 2016;50(2):319-329. doi:10.1007/s12160-015-9757-5.

147. Bannon K, Schwartz M. Impact of nutrition messages on children's food choice: Pilot study. *Appetite*. 2006;46(2):124-9.

148. Latimer A, Brawley L. A systematic review of three approaches for constructing physical activity messages: What messages work and what improvements are needed? *Int J Behav Nutr Phys Act*. 2010;7:36.

149. Fey-Yensan N, English C, Museler H. Evaluation of a nutrition education newsletter for home-delivered meal participants. *J Nutr Educ Behav*. 2002;34(1):569-70.

150. Lancaster K, Smiciklas-Wright H, Ahern F. Evaluation of a nutrition newsletter by older adults. *J Nutr Educ Behav*. 1997;29(3):145-151.

151. Lutz S, Ammerman A, Atwood J. Innovative newsletter interventions improve fruit and vegetable consumption in healthy adults. *J Am Diet Assoc*. 1999;99(6):705-9.

152. Taylor-Davis S, Smiciklas-Wright H. Responses of older adults to theory-based nutrition newsletters. *J Am Diet Assoc*. 2000;100(6):656-64.

153. Larson N, Ward D, Neelon S, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am*

Diet Assoc. 2011;111(9):1343-62.

154. Williams P, Cates S, Blitstein J, Hersey J. Nutrition-education program improves preschoolers' at-home diet: a group randomized trial. *J Acad Nutr Diet*. 2014;114(7):1001-8.

155. Bere E, Veierød M, Bjelland M. Outcome and process evaluation of a Norwegian school-randomized fruit and vegetable intervention: Fruits and Vegetables Make the Marks (FVMM). *Health Educ Res*. 2006;21(2):258-67.

156. Robinson T. Reducing children's television viewing to prevent obesity: a randomized controlled trial. *JAMA*. 1999;282(16):1561-7.

CHAPTER 3: LITERATURE REVIEW SUMMARY AND RESEARCH OBJECTIVES AND HYPOTHESES

The prevalence of obesity among children (6-11 years) in the U.S. in 2011-2014 was estimated to be 17.5%[1]. Childhood obesity increases the risk of being obese as an adult along with increased risk of type 2 diabetes, cardiovascular disease and metabolic syndrome[2,3]. Energy balance-related behaviors related to obesity among children include high intake of SSBs, skipping breakfast, lack of physical activity, and increased screen time usage among children[4].

Beverages are a major dietary component of children and adolescents. SSBs are a major source of empty calories for youth. Dairy beverage intake among children has decreased over the past 30 years[5,6], resulting in a high percentage of adolescents not meeting the Dietary Guidelines recommendations for dairy product intake[7]. High intake of SSBs and low intake of dairy among children and adolescents were associated with lower diet quality[8,9].

Parents exert a strong influence on the dietary intake of their children based on several food-related parenting practices. Parents serve as role models for beverage intake among youth. Intake of dairy beverages and SSBs by parents were related to intake of dairy beverages and SSBs intake among children in several studies[10-12]. In addition to role modeling, home beverage availability can influence intake by youth. SSBs and dairy

beverage availability at home were also associated with children's intake of these beverages in several studies[13-15].

Previous studies have used a variety of intervention strategies to reduce consumption of SSBs among children. For instance, studies have used school-based educational programs or replacing of SSBs with non-caloric beverages at home[16,17]. Studies were found to be more effective in reducing SSB intake when they were applied in home-settings versus school settings[18]. Future interventions should include parents to improve the quality of food and beverage intake and nutrition habits of children and adolescents.

A common method used in health communication to motivate health behavior change is via message framing. Gain-framed nutrition messages were rated more positively than loss-framed nutrition message[19,20]. Newsletters are a cost-effective method found to be effective in changing nutrition-related behaviors among adults[21-24].

Three studies were completed to address the need to engage parents to promote healthful beverage parenting practices based on the associations between parenting practices and child intake, and effectiveness of methods to motivate parents to perform healthful beverage parenting practices.

I. Study one: Beverage Intake among Children: Associations with Parent and Home-related Factors (Chapter 4)

Research question: Do associations exist between parental and home-related factors, (particularly instrumental knowledge regarding beverages, home availability, and role modeling), and early adolescent beverage intake?

Objective: To determine whether associations exist between parental and home-related factors and early adolescent beverage intakes among early adolescent children (9-12 years).

II. Study two: Gain-framed Messages Motivate Sugar-Sweetened Beverage Parenting Practices More than Loss-framed Messages (Chapter 5)

Research questions: Does the type of message framing (gain-framed vs. loss-framed) affect the level of motivation for parents of children (6-12 years) to role model intake of healthy beverages and to make healthy beverages available at home? Does message framing operate the same when the benefits directly affect the child and indirectly benefit the parent? Do dispositional factors affect motivation based on gain- vs. loss-framed messages?

Objective: 1) To determine whether behavioral intention differs by valence (gain-framed vs. loss-framed) of messages developed to motivate parents of early adolescent children (6-12 years) to engage in targeted behaviors. 2) To determine the effectiveness of gain- vs. loss-framed messages among parents grouped by low and high scores on home availability of SSBs, low and high SSB intake, and normal and overweight/obese status.

III. Study three: Effectiveness of an online newsletter/text message intervention promoting beverage-related parenting practices: pilot test results (Chapter 6)

Research question: Will a pilot newsletter/text message-based intervention improve parents' report of making healthy beverages available at home and role modeling intake of healthy beverages?

Objective: To test the effectiveness of a brief, pilot newsletter/text message-based intervention for parents on home availability of healthful beverages, and frequency of role modeling intake of healthful beverages for children (6-12 years).

References (Chapter 3)

1. Ogden C, Carroll M FC& FK. Prevalence of obesity among adults and youth: United States, 2011-2014. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. http://c.ymcdn.com/sites/www.acutept.org/resource/resmgr/Critical_EdgEmail/0216-prevalence-of-obesity.pdf. Published 2015.
2. Kelsey MM, Zaepfel A, Bjornstad P, Nadeau KJ. Age-related consequences of childhood obesity. *Gerontology*. 2014;60(3):222-228. doi:10.1159/000356023.
3. Malik VS, Popkin BM, Bray GA, Després J-P, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*. 2010;121(11):1356–1364.
4. Brug J, van Stralen MM, Te Velde SJ, et al. Differences in weight status and energy-balance related behaviors among schoolchildren across Europe: the ENERGY-project. *PLoS One*. 2012;7(4):e34742. doi:10.1371/journal.pone.0034742.
5. Dror DK, Allen LH. Dairy product intake in children and adolescents in developed countries: trends, nutritional contribution, and a review of association with health outcomes. *Nutr Rev*. 2014;72(2):68-81. doi:10.1111/nure.12078.
6. Nielsen SJ, Popkin BM. Changes in beverage intake between 1977 and 2001. *Am J Prev Med*. 2004;27(3):205-210. doi:10.1016/j.amepre.2004.05.005.
7. Quann E, Fulgoni V, Auestad N. Consuming the daily recommended amounts of dairy products would reduce the prevalence of inadequate micronutrient intakes in the United States: diet modeling study based on NHANES 2007-2010. *Nutr J*.

2015;14(90).

8. Piernas C, Mendez MA, Ng SW, Gordon-Larsen P, Popkin BM. Low-calorie- and calorie-sweetened beverages: Diet quality, food intake, and purchase patterns of US household consumers. *Am J Clin Nutr*. 2014;99(3):567-577. doi:10.3945/ajcn.113.072132.

9. LaRowe TL, Moeller SM, Adams AK. Beverage patterns, diet quality, and body mass index of US preschool and school-aged children. *J Am Diet Assoc*. 2007;107(7):1124-1133. doi:10.1016/j.jada.2007.04.013.

10. Diamant A, Babey S, Jones M. Teen dietary habits related to those of parents. *Policy Brief UCLA Cent Health Policy Res*. 2009;(PB2009-2):1-6.

11. Grimm G, Harnack L, Story M. Factors associated with soft drink consumption in school-aged children. *J Am Diet Assoc*. 2004; 104(8):1244-9.

12. Fisher JO, Mitchell DC, Smiciklas-Wright H, Mannino ML, Birch LL. Meeting calcium recommendations during middle childhood reflects mother-daughter beverage choices and predicts bone mineral status. *Am J Clin Nutr*. 2004, *79*, 698-706.

13. Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. *J Am Diet Assoc*. 2006;106(11):1816-24. doi:10.1016/j.jada.2006.08.018.

14. Harris TS, Ramsey M. Paternal modeling, household availability, and paternal intake as predictors of fruit, vegetable, and sweetened beverage consumption among African American children. *Appetite*. 2015;85:171-177.

doi:10.1016/j.appet.2014.11.008.

15. Ezendam N, Evans A, Stigler M. Cognitive and home environmental predictors of change in sugar-sweetened beverage consumption among adolescents. *Br J Nutr*. 2010;103(5):768-74.

16. Malik VSV, Pan A, Willett WC, Hu FBF. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *Am J Clin Nutr*. 2013;98(4):1084-1102. doi:10.3945/ajcn.113.058362.

17. French SA, Gerlach AF, Mitchell NR, Hannan PJ, Welsh EM. Household obesity prevention: Take Action—a group-randomized trial. *Obesity*. 2011;19(10):2082-2088. doi:10.1038/oby.2010.328.

18. Vargas-Garcia EJ, Evans CEL, Prestwich A, Sykes-Muskett BJ, Hooson J, Cade JE. Interventions to reduce consumption of sugar-sweetened beverages or increase water intake: evidence from a systematic review and meta-analysis. *Obes Rev*. July 2017. [Epub ahead of print] doi:10.1111/obr.12580.

19. Satia J, Barlow J, Armstrong-Brown J. A qualitative study to explore Prospect theory and message framing and diet and cancer prevention-related issues among African American adolescents. *Cancer Nurs*. 2010;33(2):102-9.

20. Wirtz J, Kulpavaropas S. The effects of narrative and message framing on engagement and eating intention among a sample of adult Hispanics. *J Nutr Educ Behav*. 2014;46(5):396-400.

21. Fey-Yensan N, English C, Museler H. Evaluation of a nutrition education newsletter for home-delivered meal participants. J Nutr Educ Behav. 2002;34(1):569-70.

22. Taylor-Davis S, Smiciklas-Wright H. Responses of older adults to theory-based nutrition newsletters. *J Am Diet Assoc*. 2000;100(6):656-64.

23. Larson N, Ward D, Neelon S, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am Diet Assoc*. 2011;111(9):1343-62.

24. Bere E, Veierød M, Bjelland M. Outcome and process evaluation of a Norwegian school-randomized fruit and vegetable intervention: Fruits and Vegetables Make the Marks (FVMM). *Health Educ Res*. 2006;21(2):258-6.

CHAPTER 4: BEVERAGE INTAKE AMONG CHILDREN: ASSOCIATIONS WITH PARENT AND HOME-RELATED FACTORS

Supporting documents are found in Appendices 8.1-8.3

I. Overview

Beverage intake can influence child diet quality in a positive or negative manner depending on the beverage type and amounts consumed. Parenting practices such as role modeling and control of home beverage availability have been associated with child beverage intake, whereas examination of the influence of parental beverage nutrition knowledge has been more limited. The purpose of this study was to examine the relationships between sugar-sweetened and dairy beverage intake among children (9–12 years) and home and parental factors. A questionnaire was administered among a convenience sample of parents (n = 194) to assess beverage nutrition knowledge, beverage intake and home availability of beverages. Children completed a questionnaire to estimate usual beverage intake. Daily sugar-sweetened beverage intake by children ranged from 0.4 to 48 oz. Logistic regression analysis was used to examine relationships. Parents were mostly female, white, well educated, and employed. Home availability of sugar-sweetened and dairy beverages was positively associated with child sugar-sweetened (OR = 1.48, p = 0.03) and dairy beverage intake (OR = 1.34, p = 0.03), respectively. Parent dairy beverage intake was associated with child dairy beverage intake (OR = 1.06, p = 0.01). Parent knowledge about sugar in beverages was related to child dairy beverage intake (OR = 1.46, p = 0.02), whereas calcium/dairy knowledge and general beverage nutrition knowledge were not related to child beverage intake. Parenting practices and knowledge may play a role in determining child beverage intake.

Keywords: children; beverage intake; parenting practices, nutrition knowledge

II. Introduction

Beverages play a major role in the diets of children and adolescents [1]. Sugar-sweetened beverages (SSBs) are a leading source of empty calories and are considered one of the key elements of child obesity prevention initiatives in the United States (U.S.) [1]. On the other hand, milk provides important nutrients such as protein, calcium and vitamin D in addition to calories [2].

Intake of SSBs by U.S. children and adolescents is a concern because of associated health issues [3–6]. Data from the National Health and Nutrition Examination Survey (NHANES) 2011–2014 showed that nearly two-thirds of U.S. youth (2–19 years) consumed at least one SSB on a given day [7]. Beverages accounted for 47% of added sugars in the diet for children and adolescents (NHANES 2009–2010) [1]. Poor diet quality in children was linked with beverage consumption patterns high in sugars and low in dairy beverages [8,9]. Three meta-analyses showed relationships between SSB intake and weight gain and type 2 diabetes in children and adolescents [4,5,10].

Intake of dairy foods is associated with meeting nutrient intake requirements for growth and development for children and adolescents [2]. However, many adolescents (9–18 years) in the U.S. do not meet 2010 Dietary Guidelines recommendations for intake of 3 daily servings of dairy products (99% of girls and 78% of boys) based on NHANES 2007–2010 data [11]. Over the past several decades, milk intake has decreased among children and adolescents [2,12], making it less likely that recommendations for dairy food intake are being met.

Using Social Cognitive Theory as an organizing framework [13], parenting practices such as role modeling and controlling home beverage availability are considered part of the social and physical environment which can be manipulated to change beverage intake behaviors of children [14,15]. Evidence for a relationship between parenting practices and SSB intake among children and adolescents [16-18] is more extensive than the limited number of studies examining the role that parenting practices play in influencing intake of dairy beverages [19–23].

Parental influence on child beverage intake may be related to knowledge about diet and health. SSB intake among adults was significantly associated with knowledge about SSBs [24], thus potentially affecting the potential to role model intake for children. However, few studies have examined the role of parental nutrition or beverage knowledge on child beverage intake or on parenting practices that could affect intake. In one study, parental nutrition knowledge (including knowledge about SSBs) was a significant predictor of Norwegian adolescents' nutrition knowledge [25]. However, SSB intake among adolescents was not significantly related to either parental or adolescent knowledge scores. In another study, parents of children 2 to 17 years (80% women, 54% White) perceived that sugary drinks, specifically sport drinks, fruit drinks, and flavored waters, were healthy options for their children [26]. Interviews with 201 parents of early adolescent children showed limited knowledge about calcium functions, requirements, and food sources and expectations for regular consumption of calcium-rich foods by children [27]. The lack of previous studies and inconsistent results of existing studies

indicates a need to better characterize the relationship between parental knowledge and beverage intake of children.

Parental influence on beverage decision making and behaviors needs to be addressed during the critical developmental period of early adolescence as dietary behaviors tend to track into adulthood [21]. The purpose of this study was to test the hypotheses that associations exist between beverage intakes among early adolescent children (9–12 years) and home and parental factors such as knowledge regarding beverages, beverage home availability, and role modeling beverage intake.

III. Materials and Methods

A. Participants

A convenience sample of parents/caregivers (n = 194) completed a questionnaire at the Minnesota State Fair in 2014 in a building specifically designed for research studies (Driven to Discover building). Parents were recruited for the study with signage posted in the building. They were eligible if they were the person primarily responsible for food acquisition/preparation of a child (9–12 years), and could complete a questionnaire in English. Children of parent participants were eligible if they were 9–12 years of age. The University Institutional Review Board approved the study with consent and assent procedures (IRB Code Number: 1405P50922). Parents and children were each given $5 in State Fair ride tickets as compensation for their participation.

B. Parent questionnaire

Items were created to assess knowledge about healthful and less healthful beverages with respect to composition (energy, nutrients, and portion sizes), recommended intakes, and relationship to health [1,28–30]. Several University faculty and graduate students reviewed the items for content validity. Nutrition undergraduate and graduate students (*n* = 97) answered the questions to assess the difficulty level and provided comments about comprehension. Items were revised as needed based on these responses. After revision, items were organized into three main categories including beverage nutrition knowledge (8 items), dairy/calcium knowledge (8 items), and knowledge about sugar in beverages (7 items). To score the items, each correct answer was assigned a point value of 1 with a possible score ranging from 0–8 or 0–7 depending on the number of items (See Supplementary Material).

C. Assessment of home beverage availability

Home availability of various beverage types was assessed using 9 questions previously evaluated for reliability and validity with parents of adolescents [31]. The questions asked: "How often would you say these beverages are available in your home?" Beverages included milk, soft drinks, fruit drinks, fruit juice, and water and the response options included 1 = always – 4 = never). Items were grouped and summed to construct continuous variables to assess the availability of SSBs (regular soda pop and fruit drinks) and dairy-based beverages (whole milk, 1%, 2% or soy milk; flavored milk; blended yogurt and juice drink or yogurt drinks). Home availability of various beverage types was assessed using 9 questions previously evaluated for reliability and validity with parents of adolescents [31]. The questions asked: "How often would you say these beverages are

available in your home?" Beverages included milk, soft drinks, fruit drinks, fruit juice, and water and the response options included 1 = always–4 = never. Items were grouped and summed to construct continuous variables to assess the availability of SSBs (regular soda pop and fruit drinks) and dairy-based beverages (whole milk, 1%, 2% or soy milk; flavored milk; blended yogurt and juice drink or yogurt drink).

D. Assessment of usual beverage intake

A previously validated 15-item beverage questionnaire was used to assess usual beverage intake among parents as an indication of modeling beverage intakes for children [32]. Beverage items included soft drinks, dairy beverages, fruit juice, water, caffeinated, and energy beverages. Respondents were asked to indicate their usual intake over the past month by indicating how often they consumed the beverage (never or less than 1 per week, 1/week, 2–3/week, 4–6/week, 1/day, 2+/day, 3+/day) and how much they consumed (less than 6 oz, 8 oz, 12 oz, more than 12 oz). Children completed 9 questions about the frequency of beverage intake from the Harvard food frequency questionnaire to assess usual intake with added questions about specific beverages [33]. The beverages were soda pop, fruit-flavored drinks, fruit juice, café latte, coffee or tea, cocoa, milk, milk on cereal, and water.

Items were grouped and summed to construct continuous variables to assess daily intake of SSBs. For parents, this included soft drinks, sweetened juice, sweetened tea, tea or coffee with cream and/or sugar, and energy drinks. For children, this included soda pop and fruit-flavored drinks. Items were grouped to construct variables to assess daily intake

of dairy-based beverages. For parents, this included whole, reduced fat, and fat-free milk. For children, this included milk, milk on cereal, and cocoa made with milk.

E. Demographic and physical characteristics

Parents provided information about demographic characteristics for themselves (age, gender, ethnicity, race, education, employment, and food assistance) and their child (age and gender). Researchers measured height and weight of children using standard procedures [34]. Mean height and weight values were used to calculate body mass index (BMI). Questionnaires were completed on iPads using a Qualtrics survey platform (Qualtrics, Provo, UT, USA). Completion of the research activities took about 10 to 15 min per family.

IV. Data analysis

Responses to grouped items (knowledge, availability, and intake) were summed across the items to produce summed scores for these continuous variables. Child daily SSB and dairy beverage intake variables were dichotomized into "8 ounces or more" and "less than 8 ounces" (8 oz = 1 fluid cup or 237 mL). For categorical variables, frequency counts and percentages were calculated. For continuous variables, means and standard deviations were computed.

Chi square tests were used to identify univariate associations between child intake outcomes (SSB and dairy beverages), child sex, parent sex, food assistance (any/none), number of children in the home, education, and employment (not shown).

Two multiple logistic regression models were constructed to estimate adjusted odds ratios and 95% confidence intervals for the binary outcomes of child sweetened beverage intake (8 ounces or more/day) and child dairy beverage intake (8 ounces or more/day). Pearson correlation analyses were conducted to determine which potential variables should be included in the regression models. Both models included summed scores for availability of sugar-sweetened beverages and dairy beverages; summed knowledge scores for beverage nutrition, dairy beverages/calcium, and sugar in beverages; parent intake of SSBs (in the dairy beverage intake model only) and dairy beverages (in the SSB intake model only); and child intake of orange juice and dairy beverages, adjusted for child sex and child age. All beverage intake variables were continuous, independent variables in the regression models. Statistical significance was assessed at the $p = 0.05$ level in all analyses. Statistical Analysis System software (SAS; version 9.3, SAS Institute Inc., Cary, NC, USA) was used to analyze all data.

V. Results

A. Participant characteristics

Information about parent (n = 194) and child (n = 194) demographic characteristics and the household is presented in Table 1. The majority of parents were white (92%), had some college/≥4-year degree (94%), were women (81%) and were employed full/part time (82%). Mean age and BMI were 43 years and 26.2 BMI units, respectively. Mean child (SD) age was 10.6 (1.1); 49% were boys.

Table 4.1 Demographic characteristics of parent and child participants in a cross-sectional survey

Parent	**Mean (SD) [Range]**
Age (n=187)	42.7 (6.1) [30 - 66]
Body Mass Index (n=143)	26.2 (5.5) [15.8 - 55.2]
	n (%)[1]
Sex[1]	
Female	154 (80.6)
Male	37 (19.4)
Relationship to child[1]	
Parents	188 (97.4)
Other	5 (2.5)
Education[1]	
High school diploma or GED	11 (5.8)
Some college or technical school	33 (17.3)
4-year college, university degree or advanced degree	147 (77.0)
Employment[1]	
Homemaker	25 (13.2)
Employed part-time	32 (16.8)
Employed full-time	124 (65.3)
Retired/Not Employed/Student)	9 (4.8)
Ethnicity[1]	
Hispanic or Latino	5 (2.7)
Not Hispanic or Latino	183 (97.3)
Race[1]	
White or Caucasian	179 (92.3)
Other	12 (6.1)
Household	**n (%)[1]**
Food Assistance[1]	

None	170 (87.6)
Public food assistance	20 (10.3)
Children <18 years in the home[1]	
1 child	30 (15.8)
2-3 children	141 (74.2)
4 or more children	19 (10.0)
Adults >18 years in the home[1]	
1	21 (11.1)
2	152 (80.0)
3 or more	17 (9.0)
Children	**Mean (SD) [Range]**
Age (n= 193)	10.6 (1.1) [9-12]
Body Mass Index (n=192)	19.0 (3.4) [13.4-33]
	n (%)
Sex[1]	
Female	98 (50.8%)
Male	95 (49.2%)
Child in home (days/week)[1]	
1-3	171 (90.0%)
4 or more	19 (10.1%)

[1]n =188-193 indicating that data are missing from 1-6 parents for these variables

B. Home beverage availability

Parents reported the availability of a variety of beverages in their home (Table 2). The two beverages that were most commonly always available were milk (whole, low-fat, or soy) (76% of homes) and bottled water (41%). The beverages rated as sometimes available at home were flavored milk (57%), hot chocolate (75%), regular soda (59%),

100% fruit juice (44%), and fruit drinks (57%). Diet soda was rated as never available at home for 44% of the respondents.

Table 4.2 Parent-reported frequency of availability of beverages at home in a cross-sectional survey

How often are these beverages available in your home?	Never n (%)[1]	Sometimes n (%)[1]	Usually n (%)[1]	Always n (%)[1]
Regular soda pop[1]	43 (22.3)	113 (58.6)	22 (11.4)	15 (7.8)
Fruit drinks (any fruit drink flavor, sports drinks, lemonade or sweetened tea)[1]	27 (14.1)	110 (57.3)	38 (19.8)	17 (8.9)
Whole, 1%, 2% or soy milk[1]	17 (8.8)	12 (6.2)	17 (8.8)	147 (76.2)
Flavored milk (chocolate, strawberry or other flavors)[1]	65 (34.2)	108 (56.8)	12 (6.2)	5 (2.6)
Blended yogurt and juice drink or yogurt drink[1]	77 (39.9)	82 (42.5)	24 (12.4)	10 (5.2)
Hot chocolate, prepared[1]	35 (18.2)	144 (75.0)	9 (4.7)	4 (2.1)
Diet soda pop[1]	85 (44.3)	55 (28.7)	25 (13.0)	27 (14.1)
100% fruit juice[1]	14 (7.35)	85 (44.0)	67 (34.7)	27 (14.0)
Bottled water[1]	30 (15.5)	43 (22.3)	41 (21.2)	79 (40.9)

[1]n = 190-193 indicating data are missing from 1-4 parents for each variable

C. Beverage intake and knowledge scores

SSB and dairy beverage intakes are shown in Table 3. For parents, water was consumed in the highest amount (mean = 28.8 oz/day, not shown), followed by low fat or fat free milk (mean = 9.3 oz/day) (Table 3), and tea or coffee without sweetener (mean = 4

oz/day, not shown) and with sweetener (mean = 4.5 oz/day) (Table 3). Parent intake of diet soft drinks was about twice that of regular soft drinks (mean = 4.3 oz (not shown) vs. mean = 1.8 oz (Table 3), respectively). Energy and sports drinks, juice drinks, and whole milk were consumed by parents at low levels (mean < 3 oz/day). Parent intake of whole milk (mean = 0.9 oz/day) and reduced fat 2% milk (mean = 2 oz/day) were about one third the amount of fat-free milk (mean = 9.3 oz/day) (Table 3).

Water was also consumed in the highest amount by children (mean = 19 oz/day, not shown), followed by milk (mean = 11 oz/day) (Table 3). No child reported consuming more than 16 oz milk/day. Milk on cereal was about one third of the total amount of milk consumed. Mean intake for regular soda pop and fruit-flavored drinks by children was 2 and 3 oz/day, respectively (Table 3). Children's intake of tea or coffee was limited (not shown).

All three knowledge scores were in the center of the range. Mean parent beverage nutrition knowledge score was 4.8 of 8 possible points with a range of 2–7 points. The mean dairy/calcium knowledge was 4.6 of 8 possible points with a range of 0–8 points. The mean parent knowledge about sugar in beverages was 4.2 of 7 possible points with a range of 0–7 points.

Table 4.3 Self-reported beverage intake of parents and children in a cross-sectional survey based on frequency and amount consumed

	Mean (SD)	
Parents (n=194)	**oz/day**	**Range**
SSB intake (5 items)	9.3 (12.6)	0-77
Soft drinks, regular	1.8 (3.9)	0-24
Sweetened juice drink (fruit ades, lemonade, punch, etc.)	1.5 (4.7)	0-48
Sweetened tea	0.6 (2.1)	0-16
Tea or coffee with cream and/or sugar	4.5 (8.4)	0-60
Energy and sports drinks (Red Bull, Gatorade, etc)	1 (3.2)	0-32
Dairy beverage intake (3 items)	12.2 (13.7)	0-61
Whole milk	0.9 (3.0)	0-24
Reduced fat milk (2%)	2 (5.7)	0-32
Low fat/fat free milk (skim, 1%, buttermilk, soymilk)	9.3 (13.5)	0-60
	Mean (SD)	
Children (n=194)	**oz/day**	**Range**
SSB intake (2 items)	4.8 (6.6)	0.4-48
Soda pop	2.0 (3.5)	0.2-24
Fruit-flavored drinks (lemonades, Kool-Aid, etc.)	2.8 (4.6)	0.2-24
Dairy beverage intake (3 items)	9.3 (2.6)	3-16
Milk (white or chocolate)	10.5 (9.2)	0.1-32
Milk on cereal	2.9 (3.1)	0.1-14
Cocoa made with milk	0.4 (1.4)	0-16

D. Associations between beverage intake and parent and home-related factors

The adjusted odds of child sugar-sweetened beverage consumption of 8 ounces or more per day were 1.48 times higher for each additional level of available sugar-sweetened beverages in the home. The adjusted odds ratio of sugar-sweetened beverage intake of 8 ounces or more per day for boys compared to girls was 3.35. No other factors included in the model were significantly associated with child sugar-sweetened beverage intake (Table 4).

The adjusted odds of child dairy beverage intake of 8 ounces or more per day were 1.46 times higher for each additional unit (score) of parent knowledge about sugar in beverages, 1.06 times higher for each additional unit of parent dairy beverage intake, and 1.34 times higher for each additional level of available dairy beverages in the home (Table 4). No other factors included in the model were significantly associated with child dairy beverage intake (Table 4).

Table 4.4 Associations between child SSB and dairy beverage intakes and parent and home-related factors based on multiple logistic regression models

Outcome Measure	Child SSB intake[1] Odds ratio [95% CI]	P value	Child dairy beverage intake[1] Odds ratio [95% CI]	P value
Home characteristics				
Availability of SSBs	1.48 [1.03 - 2.13]	0.03	0.74 [0.53 - 1.05]	0.09
Availability of dairy beverages	1.27 [0.92 - 1.77]	0.15	1.34 [1.03 -1.73]	0.03
Parent characteristics				
Beverage nutrition knowledge	0.90 [0.55 - 1.34]	0.50	0.76 [0.52 - 1.13]	0.17
Sugar in beverages knowledge	0.83 [0.58 - 1.20]	0.32	1.46 [1.06 – 1.99]	0.02
Dairy/calcium knowledge	1.07 [0.81 - 1.43]	0.63	0.96 [0.75 - 1.22]	0.72
SSB intake	0.99 [0.95 - 1.03]	0.59	1.00 [0.96 - 1.03]	0.91
Parent dairy beverage intake	0.98 [0.95 - 1.02]	0.38	1.06 [1.02 - 1.10]	0.01
Child characteristics				
Sex (boy vs. girl)	3.35 [1.30 - 8.66]	0.01	1.49 [0.69 - 3.26]	0.31
Orange juice intake	1.11 [0.97 - 1.27]	0.14	1.15 [0.98 - 1.34]	0.09
Dairy beverage intake	1.09 [0.91 - 1.30]	0.35	-	-
SSB intake	-	-	1.00 [0.94 – 1.06]	0.91

[1]Odds ratios are adjusted for child sex and age and other factors in the model, n=194

VI. Discussion

This study examined relationships between parental and home-related factors and child beverage intakes among a convenience sample of parents and early adolescent children (9–12 years). As hypothesized, availability of sugar-sweetened and dairy beverages was associated with child sugar-sweetened and dairy beverage intakes, respectively. Several

studies have shown that education level influences the initiation of behaviors to establish healthy lifestyles [35–37]. Studies have suggested that higher education levels contribute to having essential health information, knowledge, skills, values, and psychological control in order to choose behaviors to establish healthy lifestyles [38]. The high education level of parents in the current sample may have contributed to their likelihood of controlling home beverage availability to influence child beverage intake. The majority of parents reported only having SSBs available at home sometimes and child intake of SSBs was low compared to national intake data [7]. Previous studies among children 2.5 to 7 years old [39], 5–10 years old [40], and adolescents aged 11 years [41] also showed that SSB availability was associated with child intake among well-educated parents.

Findings from the current study also correspond with previous studies indicating that boys had a higher SSB intake than girls [42–46]. Selection of SSBs may currently be considered a less healthy choice by teens based on recent media health promotion efforts regarding the sugar content of beverages [47]. Females may be reacting more favorably to these efforts because they tend to have greater concern about body weight [48] and are more likely to rate food choice behaviors as important compared to males [49–51].

The associations observed in the current study between the availability of dairy beverages at home and child dairy beverage intake were consistent with several studies in samples of primarily white children and adolescents [21,52,53]. On the other hand, Patrick et al. [54] did not find an association between home availability of dairy beverages and child

dairy beverage intake among African-American and Hispanic parents and their preschool children. In another study, nearly half of low-income African-American adolescents (10–14 years) did not meet the daily recommendation for dairy foods [55]. A possible reason for the discrepancy in results may be the high prevalence of lactose intolerance across racial and ethnic groups including African Americans and Hispanics, thus limiting both home availability and intake of dairy beverages [56].

In the current study, parent dairy/calcium knowledge was not associated with child dairy beverage intake. A previous cross-sectional study with similar knowledge questions and scores showed that frequency of parenting practices such as encouragement, making calcium-rich foods available, and setting expectations for intake of these foods were associated with greater parent calcium knowledge, but relationships with child intake of calcium-intake foods were not examined [57]. In the current study, parent knowledge about sugar in beverages was associated with greater odds for child dairy beverage intake possibly because knowledge about sugar in beverages made parents aware of the importance of dairy beverage intake for their children as a healthier alternative to SSBs.

Parent dairy beverage intake, a proxy for role modeling, was associated with child dairy beverage intake in the current study. Similarly, other studies have observed a positive association between parental dairy food/beverage intake and child dairy food/beverage intake [52,53,58,59], emphasizing the importance of parental role modeling as an intervention target to improve child dairy beverage intake. However, such interventions

may need to be tailored to parent characteristics such as race, ethnicity and education level.

A strength of the current study was the use of parent-child dyads to better inform relationships between parent knowledge, parenting practices and child behaviors. Another strength was that children reported their own intake rather than dependence on parent report of child behavior. A limitation in this study was the use of a small convenience sample. The convenience sample consisted primarily of white, well-educated parents, likely because data collection was completed at a university-sponsored research building. Therefore, results cannot be applied broadly to other groups of parents. Other limitations are that the difficulty level of the knowledge items was used to develop the knowledge questionnaires, however, further validity testing was not performed. Intake of dairy foods in addition to dairy-based beverages that could help children meet dairy food recommendations were not considered. Only one parent in the family was asked to report beverage intake, however, both parents are likely to model beverage intake for their children. Lastly, this study had a cross-sectional study design, therefore cause and effect cannot be determined.

VII. Conclusions

Results of the current study indicate that controlling home beverage availability and role modeling by parents may influence child beverage intake, whereas only parent knowledge about sugar in beverages was associated with child dairy beverage intake. Further study to better understand the breadth and type of knowledge topics is needed to inform the development of educational interventions for parents. Interventions for parents

that focus on limiting the home availability of sugar-sweetened beverages and role modeling dairy beverage intake may be effective in promoting healthy beverage intakes among children.

VIII. References (Chapter 4)

1. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015–2020 Dietary Guidelines for Americans. 8th Edition. December 2015.
2. Dror, D.K.; Allen, L.H. Dairy product intake in children and adolescents in developed countries: Trends, nutritional contribution, and a review of association with health outcomes. *Nutr. Rev*. 2014, *72*, 68–81, doi:10.1111/nure.12078.
3. De Ruyter, J.C.; Olthof, M.R.; Seidell, J.C.; Katan, M.B. A trial of sugar-free or sugar-sweetened beverages and body weight in children. *N. Engl. J. Med*. 2012, *367*, 1397–1406, doi:10.1056/NEJMoa1203034.
4. Malik, V.S.V.; Pan, A.; Willett, W.C.; Hu, F.B.F. Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. *Am. J. Clin. Nutr.* 2013, *98*, 1084–1102, doi:10.3945/ajcn.113.058362.
5. Wang, M.; Yu, M.; Fang, L.; Hu, R.-Y. Association between sugar-sweetened beverages and type 2 diabetes: A meta-analysis. *J. Diabetes Investig*. 2015, *6*, 360–366, doi:10.1111/jdi.12309.
6. Ambrosini GL, Oddy WH, Huang RC, Mori TA, Beilin LJ, Jebb SA. Prospective associations between sugar-sweetened beverage intakes and cardiometabolic risk factors in adolescents. *Am J Clin Nutr*. 2013 *98*(2) 327-334. doi:10.3945/ajcn.112.051383Rosinger, A.; Herrick, K.; Gahche, J.; Park, S. Sugar-sweetened beverage consumption among U.S. youth, 2011–2014. *NCHS Data Brief* 2017, *271*, 1–8.

7. LaRowe, T.; Moeller, S.; Adams, A. Beverage patterns, diet quality, and body mass index of U.S. preschool and school-aged children. *J. Am. Diet. Assoc*. 2007, *107*, 1124–1133.
8. Piernas, C.; Mendez, M.A.; Ng, S.W.; Gordon-Larsen, P.; Popkin, B.M. Low-calorie- and calorie-sweetened beverages: Diet quality, food intake, and purchase patterns of U.S. household consumers. *Am. J. Clin. Nutr*. 2014, *99*, 567–577, doi:10.3945/ajcn.113.072132.
9. Vartanian, L.R.; Schwartz, M.B.; Brownell, K.D. Effects of soft drink consumption on nutrition and health: A systematic review and meta-analysis. *Am. J. Public Health* 2007, *97*, 667–675, doi:10.2105/AJPH.20 05.083782.
10. Quann, E.; Fulgoni, V.; Auestad, N. Consuming the daily recommended amounts of dairy products would reduce the prevalence of inadequate micronutrient intakes in the United States: Diet modeling study based on NHANES 2007–2010. *Nutr. J*. 2015, *14*, 90.
11. Miller, G.; Merlo, C.; Demissie, Z.; Sliwa, S.; Park, S. Trends in beverage consumption among high school students—United States, 2007–2015. *MMWR Morb. Mortal. Wkly. Rep*. 2017, *66*, 112–116, doi:10.15585/mmwr.mm6604a5.
12. Bandura, A. *Social Foundations of Thought and Action: A Social Cognitive Perspective*; Princeton-Hall: Englewood Cliffs, NJ, USA, 1986.
13. Santiago-Torres, M.; Adams, A.; Carrel, A. Home food availability, parental dietary intake, and familial eating habits influence the diet quality of urban Hispanic children. *Child. Obes*. 2014, *10*, 408–415.

14. Wyse, R.; Campbell, E.; Nathan, N. Associations between characteristics of the home food environment and fruit and vegetable intake in preschool children: A cross-sectional study. *BMC Public Health* 2011, *11*, 938.
15. Vaughn, A.E.; Dearth-Wesley, T.; Tabak, R.G.; Bryant, M.; Ward, D.S. Development of a comprehensive assessment of food parenting practices: The home self-administered tool for environmental assessment of activity and diet family food practices survey. *J. Acad. Nutr. Diet*. 2017, *117*, 214–227, doi:10.1016/j.jand.2016.07.021.
16. Yee, A.Z.H.; Lwin, M.O.; Ho, S.S. The influence of parental practices on child promotive and preventive food consumption behaviors: A systematic review and meta-analysis. *Int. J. Behav. Nutr. Phys. Act*. 2017, *14*, 47, doi:10.1186/s12966-017-0501-3.
17. Diamant, A.; Babey, S.; Jones, M. Teen dietary habits related to those of parents. UCLA Health Policy Brief. 2009.
18. Reicks, M.; Degeneffe, D.; Ghosh, K.; Bruhn, C.; Goodell, L.S.; Gunther, C.; Auld, G.; Ballejos, M.; Boushey, C.; Cluskey, M.; et al. Parent calcium-rich-food practices/perceptions are associated with calcium intake among parents and their early adolescent children. *Public Health Nutr*. 2012, *15*, 331–340, doi:10.1017/S1368980011001133.
19. Bauer, K.W.; Neumark-Sztainer, D.; Fulkerson, J.A.; Hannan, P.J.; Story, M. Familial correlates of adolescent girls' physical activity, television use, dietary intake, weight, and body composition. *Int. J. Behav. Nutr. Phys. Act*. 2011, *8*, 25, doi:10.1186/1479-5868-8-25.

20. Larson, N.I.; Story, M.; Wall, M.; Neumark-Sztainer, D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. *J. Am. Diet. Assoc*. 2006, *106*, 1816–1824, doi:10.1016/j.jada.2006.08.018.
21. Bere E, Sørli Glomnes E, te Velde S.J, Klepp K-I. Determinants of adolescents' soft drink consumption. Public Health Nutr. 2008;11: 49–56. doi:10.1017/S1368980007000122.
22. De Craemer, M.; De Decker, E.; De Bourdeaudhuij, I.; Vereecken, C.; Deforche, B.; Manios, Y.; Cardon, G. Correlates of energy balance-related behaviours in preschool children: A systematic review. *Obes. Rev*. 2012, *13*, 13–28.
23. Park, S.; Onufrak, S.; Sherry, B.; Blanck, H. The relationship between health-related knowledge and sugar-sweetened beverage intake among U.S. adults. *J. Acad. Nutr. Diet.* 2014, *114*, 1059–1066.
24. Bjelland, M.; Hausken, S.E.S.; Sleddens, E.F.C.; Andersen, L.F.; Lie, H.C.; Finset, A.; Maes, L.; Melbye, E.L.; Glavin, K.; Hanssen-Bauer, M.W.; et al. Development of family and dietary habits questionnaires: The assessment of family processes, dietary habits and adolescents' impulsiveness in Norwegian adolescents and their parents. *Int. J. Behav. Nutr. Phys. Act.* 2014, *11*, 130.
25. Munsell, C.; Harris, J.L.; Sarda, V.; Schwartz, M.B. Parents' beliefs about the healthfulness of sugary drink options: Opportunities to address misperceptions. *Public Health Nutr*. 2016, *19*, 46–54.
26. Cluskey, M.; Auld, G.; Edlefsen, M.; Zaghloul, S.; Bock, M.; Bourshey, C.J.; Bruhn, C.; Goldberg, D.; Misner, S.; Olson, B.; et al. Calcium knowledge, concern, and

expectations for intake among parents of Asian, Hispanic and non-Hispanic White early adolescents. *The Forum for Family and Consumer*. 2008;13(3).

27. U.S. Department of Agriculture, Agricultural Research Service. USDA National Nutrient Database for Standard Reference, Release 24. 2011. Nutrient Data Laboratory Home Page.
28. National Recreation and Park Association. *Hearts n' Parks—Report of 2004 Magnet Center Performance Data*; National Recreation and Park Association: Ashburn, VA, USA, 2004.
29. Ross, A.C.; Taylor, C.L.; Yaktine, A.L.; Del Valle, H.B. *Dietary Reference Intakes for Calcium and Vitamin D*; Food and Nutrition Board, Institute of Medicine: Washington, DC, USA, 2010.
30. Neumark-Sztainer, D.; Wall, M.; Perry, C.; Story, M. Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Prev. Med. (Baltim)* 2003, *37*, 198–208.
31. Hedrick, V.; Savla, J.; Comber, D.; Flack, K. Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): Sugar-sweetened beverages and total beverage energy intake. *J. Acad. Nutr. Diet*. 2012, *112*, 840–849.
32. Rockett, H.; Berkey, C.; Field, A.; Colditz, G. Cross-sectional measurement of nutrient intake among adolescents in 1996. *Prev. Med. (Baltim)* 2001, *33*, 27–37.
33. Lohman, T.; Roache, A.; Martorell, R. Anthropometric standardization reference manual. *Med. Sci. Sports Exerc.* 1992, *24*, 952.

34. Campbell, K.; Abbott, G.; Spence, A.; Crawford, D. Home food availability mediates associations between mothers' nutrition knowledge and child diet. Appetite. 2013, *71*, 1-6.
35. McLeod, E.; Campbell, K.; Hesketh, K. Nutrition knowledge: A mediator between socioeconomic position and diet quality in Australian first-time mothers. *J. Am. Diet. Assoc*. 2011, *111*, 696–704.
36. Vereecken, C.; Maes, L. Young children's dietary habits and associations with the mothers' nutritional knowledge and attitudes. *Appetite* 2010, *54*, 44–51.
37. Rosenkranz, R. Model of the home food environment pertaining to childhood obesity. *Nutr. Rev*. 2008, *66*, 123–140.
38. De Coen, V.; Vansteelandt, S.; Maes, L.; Huybrechts, I.; De Bourdeaudhuij, I.; Vereecken, C. Parental socioeconomic status and soft drink consumption of the child. The mediating proportion of parenting practices. *Appetite* 2012, *59*, 76–80, doi:10.1016/j.appet.2012.03.024.
39. Kunin-Batson, A.; Seburg, E.; Crain, A. Household factors, family behavior patterns, and adherence to dietary and physical activity guidelines among children at risk for obesity. *J. Nutr*. 2015, *47*, 206–215.
40. Bjelland, M.; Lien, N.; Grydeland, M.; Bergh, I.H.; Anderssen, S.A.; Ommundsen, Y.; Klepp, K.I.; Andersen, L.F. Intakes and perceived home availability of sugar-sweetened beverages, fruit and vegetables as reported by mothers, fathers and adolescents in the HEIA (HEalth In Adolescents) study. *Public Health Nutr*. 2011, *14*, 2156–2165, doi:10.1017/S1368980011000917.

41. Park, S.; Blanck, H.; Sherry, B.; Brener, N. Factors associated with sugar-sweetened beverage intake among United States high school students. *J. Nutr*. 2012, *142*, 306–312.

42. Ogden, C.L.; Kit, B.K.; Carroll, M.D.; Park, S. Consumption of sugar drinks in the United States, 2005–2008. *NCHS Data Brief* 2011, *71*, 1–8. rief/links/0fcfd50b3c386a2f45000000.pdf

43. Ranjit, N.; Evans, M.; Byrd-Williams, C.; Evans, A. Dietary and activity correlates of sugar-sweetened beverage consumption among adolescents. *Pediatrics* 2010, *126*, e754.

44. Wang, Y.C.; Bleich, S.N.; Gortmaker, S.L. Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among U.S. children and adolescents, 1988–2004. *Pediatrics* 2008, *121*, e1604–e1614.

45. Wiecha, J.L.; Finkelstein, D.; Troped, P.J.; Fragala, M.; Peterson, K.E. School vending machine use and fast-food restaurant use are associated with sugar-sweetened beverage intake in youth. *J. Am. Diet. Assoc*. 2006, *106*, 1624–1630.

46. Farley, T.A.; Halper, H.S.; Carlin, A.M.; Emmerson, E.M., Foster, K.N.; Fertig, F.R. Mass media campaign to reduce consumption of sugar-sweetened beverages in a rural area of the United States. *Am. J. Public Health* 2017, *107*, 989–995.

47. Wardle, J.; Haase, A.M.; Steptoe, A.; Nillapun, M.; Jonwutiwes, K.; Bellisie, F. Gender differences in food choice: The contribution of health beliefs and dieting. *Ann. Behav. Med*. 2004, *27*, 107–116, doi:10.1207/s15324796abm2702_5.

48. Courtenay, W.H.; Mccreary, D.R.; Merighi, J.R. Gender and ethnic differences in health beliefs and behaviors. *J. Health Psychol*. 2002, *7*, 219–231, doi:10.1177/1359105302007003216.
49. Furnham, A.; Hrkcaldy, B. Age and sex differences in health beliefs and behaviours. *Psychol. Rep*. 1997, *80*, 63–66, doi:10.2466/pr0.1997.80.1.63.
50. Wardle, J.; Steptoe, A.; Bellisle, F.; Davou, B.; Reschke, K.; Lappalainen, R.; Fredrikson, M. Healthy dietary practices among European students. *Health Psychol*. 1997, *16*, 443–450.
51. Fisher, J.O.; Mitchell, D.C.; Smiciklas-Wright, H.; Mannino, M.L.; Birch, L.L. Meeting calcium recommendations during middle childhood reflects mother-daughter beverage choices and predicts bone mineral status. *Am. J. Clin. Nutr*. 2004, *79*, 698–706.
52. Hanson, N.I.; Neumark-Sztainer, D.; Eisenberg, M.E.; Story, M.; Wall, M. Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables and dairy foods. *Public Health Nutr*. 2005, *8*, 77–85.
53. Patrick, H.; Nicklas, T.; Hughes, S.O.; Morales, M. The benefits of authoritative feeding style: Caregiver feeding styles and children's food consumption patterns. *Appetite* 2005, *44*, 243–249.
54. Wang, Y.; Jahns, L.; Tussing-Humphreys, L.; Xie, B.; Rockett, H.; Liang, H.; Johnson, L. Dietary intake patterns of low-income urban African-American adolescents. *J. Am. Diet. Assoc*. 2010, *110*, 1340–1345.
55. Suchy, F.J.; Brannon, P.M.; Carpenter, T.O.; Fernandez, J.R.; Gilsanz, V.; Gould, J.B.; Hall, K.; Hui, S.L.; Lupton, J.; Mennella, J.; et al. National Institutes of Health

Consensus Development Conference: Lactose intolerance and health. *Ann. Intern. Med*. 2010, *152*, 792–796, doi:10.7326/0003-4819-152-12-201006150-00248.

56. Gunther, C.W.; Rose, A.M.; Bruhn, C.; Cluskey, M.; Reicks, M.; Richards, R.; Wong, S.S.; Boushey, C.J.; Misner, S.; Olson, B. Parents' calcium knowledge is associated with parental practices to promote calcium intake among parents of early adolescent children. *J. Ext.* 2015, *53*, 14.
57. Lee, S.; Reicks, M. Environmental and behavioral factors are associated with the calcium intake of low-income adolescent girls. *J. Am. Diet. Assoc*. 2003, *103*, 1526–1529, doi:10.1016/j.jada.2003.08.020.
58. Reicks, M.; Ballejos, M.E.; Goodell, L.S.; Gunther, C.; Richards, R.; Wong, S.S.; Auld, G.; Boushey, C.J.; Bruhn, C.; Cluskey, M.; et al. Individual and family correlates of calcium-rich food intake among parents of early adolescent children. *J. Am. Diet. Assoc*. 2011, *111*, 376–384, doi:10.1016/j.jada.2010.11.020.

CHAPTER 5: GAIN-FRAMED MESSAGES MOTIVATE SUGAR-SWEETENED BEVERAGE PARENTING PRACTICES MORE THAN LOSS-FRAMED MESSAGES

Supporting documents are found in Appendices 8.1-8.2, 8.4-8.6

I. Overview

Objective: The purpose was to test effectiveness of message framing on motivation for parenting practices targeting a reduction in child sugar-sweetened beverage (SSB) intake (controlling beverage availability, role modeling) and dispositional factors moderating effectiveness.

Methods: Parents (n = 380) completed a survey to assess motivation, usual beverage intake, and home beverage availability; paired t-tests were used to examine relationships for all parents and subgroups by SSB intake, home availability and weight status.

Results: Gain- versus loss-framed messages resulted in higher motivation for both parenting practices for all parents (n = 380, $P < 0.01$) and most subgroups. However, no differences were observed by message frame for parents in low home SSB availability ($P = 0.068$) or BMI groups ($P = 0.066$ and 0.069) for controlling availability.

Conclusions and Implications: Gain- versus loss-framed messages were more motivating, therefore interventions could use gain-framed messages to decrease intake of SSBs by children.

Keywords: parenting practices, sugar-sweetened beverages, gain and loss-framed messages

II. Introduction

Consumption of sugar-sweetened beverages (SSBs) by children in the United States (U.S.) is a concern because of high intake[1,2] and associated health problems.[3–6] Parenting practices, such as role modeling and controlling beverage availability are considered part of the social and physical environment which can be manipulated by parents to change SSB intake behaviors of children under the organizing framework of Social Cognitive Theory.[7,8]

Message framing is a common method used to promote health behavior change.[9,10] Gain-framed messages have been found to be more effective for prevention behaviors (sunscreen use and exercise) whereas, loss-framed messages were more effective for detection behaviors (breast self-exams).[11,12] In addition, a recent review suggested that gain-framed messages were more effective when the individual had a low level of involvement or interest in the issue, the outcome of the behavior was certain, and the behavior helped individuals avoid risk.[10] Another review found additional dispositional factors that consistently moderated motivation based on gain and loss framing of health messages including self-efficacy beliefs and ambivalence.[13] The frequency of SSB parenting practices and weight status may reflect dispositional factors such as self-efficacy beliefs, level of involvement, or risk aversion. The limited number of studies that tested message framing to promote healthy dietary behaviors supported the effectiveness of gain- vs. loss-framed messaging but few studies examined the effects of various dispositional factors.[14–17]

Studies involving message framing to change dietary behaviors have primarily focused on messages that target behaviors of the person receiving the message.[14–16] Few studies have investigated how message framing might be used to promote behaviors aimed at the health of someone other than the person receiving the message (proxy).[18] For example, parenting practices that affect the diet of children are completed by parents to directly benefit the health of their child. Little is known about how gain- and loss-framed messages may operate in this case. Having healthy children translates into benefits for parents such as limiting future healthcare costs and enhancing peace of mind,[19] therefore message framing may operate in a similar manner when the benefits directly impact the child and indirectly benefit the parent. Furthermore, few studies have examined the effectiveness of message framing to promote different behaviors that could achieve the same outcome.[20] For example, a variety of parenting practices can be used to promote the same healthy dietary behavior and health outcomes for children.[20]

The purpose of this study was to test the hypothesis that exposure to gain-framed messages would result in greater intention for parents of children (6-12 years) for two different behaviors (role modeling intake and controlling home availability of SSBs) compared to exposure to loss-framed messages. Additionally, the effectiveness of gain- and loss-framed messages were tested among parents grouped by low and high scores on home availability of SSBs, low and high SSB intake, and normal and overweight/obese status.

III. Methods

A. Participants

Parents/caregivers attending the Minnesota State Fair in 2015 were recruited to complete a questionnaire in a building specifically designed for research studies (Driven to Discover building) through a website providing study information. Parents were eligible if they had a child (6-12 years), had primary responsibility for food acquisition and preparation, and could complete the survey in English. The University Institutional Review Board approved the study with consent procedures. In return for participation, parents were given $5 in cash and a backpack.

B. Message Development

Gain- and loss-framed messages were developed for parents promoting two parenting practices that addressed a single overall health outcome for children - role modeling intake and controlling home availability of beverages to limit SSB intake and improve diet quality and health. Message phrasing was based on recent examples where gain-framed messages focused on benefits of engaging in the behavior and loss-framed messages focused on the costs of not engaging in the behavior. [10,21,22]

An initial set of PowerPoint slides was developed presenting facts about the usual daily calories children consumed from added sugars, the relationship between high intake of sugary drinks and overweight or obesity, health risks associated with overweight or obesity, and prevalence of childhood obesity. These slides were followed by slides including the gain- and loss-framed messages for role modeling and controlling home

beverage availability. The slides were transformed into short YouTube videos, tested with a small group of parents (n = 8) for clarity and comprehension, and revised accordingly.

For implementation, the revised slides were embedded as still images as part of a Qualtrics survey platform. The messages developed for each parenting practice are presented in Figure 1 and Supplemental File 1. The order of the messages was randomized within the Qualtrics survey.

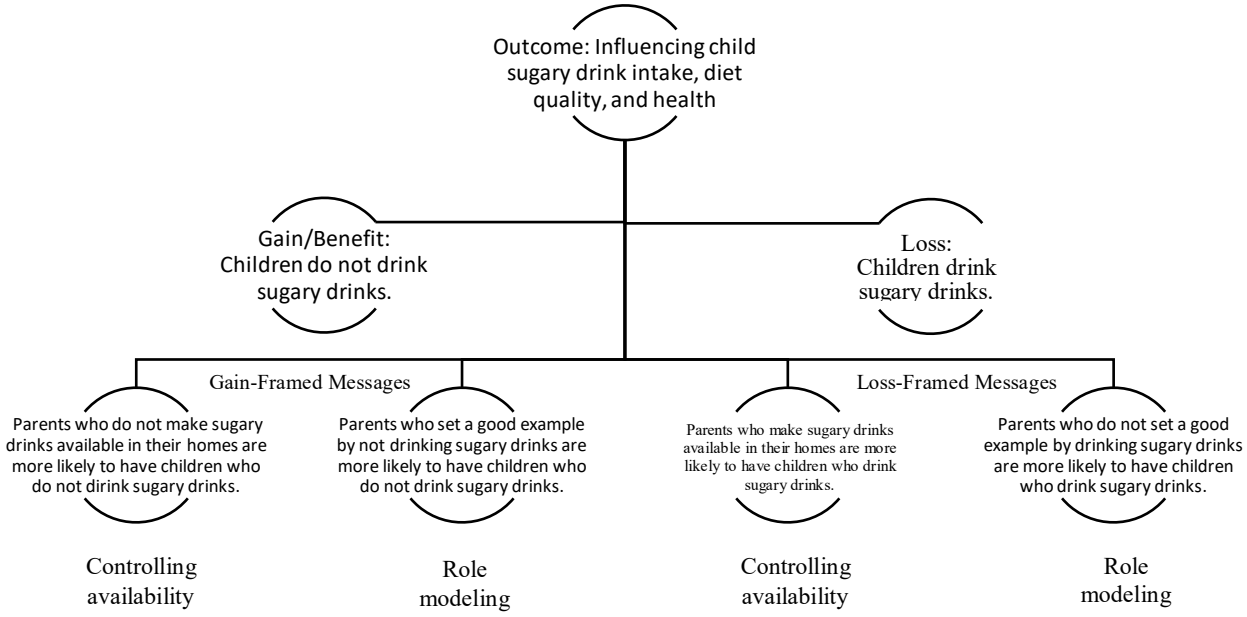


Figure 5.1 Two parenting practices intended to achieve the same outcome based on gain- and loss-framed messages

C. Questionnaire Components

Questions to evaluate motivation/behavioral intention with respect to controlling availability of beverages and role modeling included: How much would this message motivate you to have healthy beverages at home for your child to drink (controlling home beverage availability)? and How much would this message motivate you to set a good example for your child by drinking healthy beverages (role modeling beverage intake)? Response options were 1 = not at all – 4 = a lot.

A subset of parents (n = 75) were asked if they perceived the messages to be framed according to the intended valence. Parents were asked whether the consequences of the parenting practices were described in a positive or negative way. Response options were positive, negative, and I do not know.

Home availability of beverages was measured with 9 questions based on a similar questioning framework for foods available at home that had been used with parents of adolescents in a previous study.[23] The questions asked parents how often milk, soft drinks, fruit drinks, fruit juice, and water were available in their home with response options of always = 1 - never = 4. Items were grouped to construct variables to assess the availability of sugar-sweetened beverages (regular soda pop and fruit drinks).

Usual beverage intake was assessed using a 15-item beverage questionnaire[24] previously evaluated for validity and reliability as an indication of modeling beverage intakes. Hedrick et al. found that beverage intake measured with the 15-item beverage

questionnaire was significantly correlated with intake measured with three 24-hour dietary recalls (SSB R^2=0.69), but not with whole milk. Various beverage items were included (dairy, sugar-sweetened, caffeinated, and energy beverages). Respondents were asked to indicate their usual intake over the past month by indicating how often they consumed the beverage (never or less than 1 per week, 1/week, 2-3/week, 4-6/week, 1/day 2+/day, 3+/day) and how much they consumed (less than 6 oz., 8oz, 12 oz., more than 12 oz.). Items were grouped to construct variables to assess daily intake of SSBs including soft drinks, sweetened juice, sweetened tea, tea or coffee with cream and/or sugar, and energy drinks.

Parents answered questions assessing demographic and physical characteristics for themselves (age, sex, race, ethnicity, education, employment, food assistance, self-reported height and weight) and for their child (age, sex, self-reported height and weight). Surveys were completed on iPads using a Qualtrics survey platform in about 10 minutes per participant.

IV. Data Analysis

For categorical variables, frequency counts were calculated. For continuous variables, means and standard deviations were computed. BMI (kg/m^2) was calculated for parents from self-reported height and weight. Paired t-tests were used to determine differences in behavioral intention by type of message framing among all parents and parent subgroups. Parents were divided into subgroups based on weight status (normal weight: BMI < 25, n = 130, and overweight and obese: BMI ≥ 25, n = 202), low and high home availability of

SSBs (below or above an availability rating of 5 (n = 170 and 210, respectively), and intake of SSBs (below or above median intake (n = 191 and 189, respectively). Statistical significance was assessed at the *P* = .05 level. Statistical Analysis System software (SAS; version 9.3) was used to analyze data.

V. Results

Three-hundred and eighty parents completed the survey. The majority were white (90.7%), women (79.7%), employed full time (72.9%), and had a 4 year degree college (70.5%); mean age was 42.0 years and mean BMI was 27.3 (Table 1). Twenty-eight percent of children were from 6-8 years old and 71.5% were 9-12 years old ; 50% were girls; and mean child (SD) BMI was 18.6 (4.4).

Table 5.1 Demographic Characteristics of Parent Survey Respondents

Characteristic	Mean (SD)
Age (n = 380)	42.0 (6.6)
Body Mass Index (n = 331)	27.3 (6.0)
	n (%)
Gender	
Female	303 (79.7)
Male	77 (20.3)
Education	
High school diploma/GED or less	21 (5.5)
Some college or technical school	91 (24.0)

4-year college, university degree or advanced degree	268 (70.5)
Employment	
Not employed (Student/homemaker/not employed/retired)	49 (12.9)
Employed part-time	54 (14.2)
Employed full-time	277 (72.9)
Ethnicity	
Hispanic or Latino	7 (1.8)
Not Hispanic or Latino	373 (98.2)
Race	
White/Caucasian	345 (90.8)
Non-white	35 (9.2)
Food Assistance Programs	
None	343 (90.3)
SNAP/WIC/Free or reduced price school meals/Food shelves)	50 (13.2)

SNAP - Supplemental Nutrition Assistance Program
WIC - Women, Infants and Children Supplemental Assistance Program
Where n ≠ 380 data are missing

The manipulation check with 75 parents showed that a majority perceived the messages to be framed according to the intended valence. For the behavior of controlling availability of beverages for children, 85% of parents perceived the gain-framed message as positive; and 56% of parents perceived the loss-framed message as negative. For the behavior of role modeling beverage intake, 87% of parents perceived the gain-framed message as positive; and 76% of parents perceived the loss-framed message as negative.

A greater number of parents indicated that the gain-framed versus the loss-framed messages would motivate them (some and a lot) to control beverage availability at home (73.2% vs. 65.8%) and to role model beverage intake for their children (76.1% vs. 64.0%). Mean intention to control beverage availability in the home was greater (P = .002) after exposure to the gain-framed message (M=3.06, SD= 0.90) compared to the loss-framed message (M=2.93, SD= 0.96). Mean intention was also greater for role modeling beverage intake for children after exposure to the gain-framed message (M=3.10, SD= 0.85) (P <.001) compared to the loss-framed message (M=2.81, SD= 1.03).

In the group with high availability of SSBs at home, exposure to the gain-framed message resulted in a higher mean intention to control availability of beverages at home (P < .010) compared to parents exposed to the loss-framed message. However, in the group with low availability of SSBs at home, intention was not different after exposure to either the gain or loss framed message (P = .068). For parents consuming either a low or high amount of SSBs, intention to role model beverage intake was greater after exposure to the gain vs. the loss framed messages (P = .001) (Table 2).

Table 5.2 Behavioral intention[1] for parenting practices based on message valence

	Gain-framed	Loss-framed		Gain-framed	Loss-framed	
Parenting Practice	Mean (SD)	Mean (SD)	*P* value[2]	Mean (SD)	Mean (SD)	*P* value[2]
	Low Availability SSB			High Availability SSB		
Controlling availability	3.01 (0.90)	2.90 (0.98)	0.068	3.12 (0.90)	2.97 (0.96)	0.010
	Low SSB Intake			High SSB Intake		
Role modeling	3.21 (0.85)	2.86 (1.10)	0.0001	2.96 (0.83)	2.75 (0.95)	0.0005
	Normal weight parents			Overweight and obese parents		
Controlling availability	3.19 (0.86)	3.06 (0.95)	0.049	3.03 (0.90)	2.93 (0.96)	0.069
Role modeling	3.17 (0.82)	2.93 (1.07)	0.001	3.13 (0.83)	2.80 (1)	<0.0001

[1]Mean of response options 1 – 4, where 1 = not at all - 4 = a lot.
[2]*P* value based on paired ttest

Regardless of weight status, the gain-framed messages resulted in higher mean intention to role model beverage intake ($P < .001$) compared to the loss-framed messages. For both normal and overweight/obese subgroups, no differences were observed in mean intention to control beverages availability at home after viewing the gain- and loss-framed messages ($P = .066$ and .069, respectively) (Table 2).

VI. Discussion

For all parents and most parent subgroups, findings from the current study showed that gain-framed messages produced greater motivation than loss-framed messages for both SSB parenting practices aimed at achieving the same outcome and focusing on behaviors that produced indirect benefits for the message recipient. Therefore the general principle that gain-framed messages are more effective than loss-framed message in promoting prevention behaviors like healthy eating as shown in several reviews,[10,18] is also likely to be applicable to messages targeting multiple parenting practices to improve diet and health of children.

Self-efficacy has been tested as a dispositional factor hypothesized to moderate the effectiveness of gain- or loss-framed health messages with inconclusive results.[13] In other studies, self-efficacy of parents was associated with SSB intake among young children in an observational study,[25] proposed as a control belief for serving SSBs to children by parents in a qualitative study,[26] and addressed through motivational interviewing as an intervention target to help parents control child SSB intake.[27] In the current study, the subgroup of parents with low home SSB availability may have been intentionally not

keeping SSBs in the home to limit child intake based on strong self-efficacy for this parenting practice (although self-efficacy was not assessed). For these parents, no differences were observed in motivation based on gain- or loss-framed messages, thus the relationship between a potentially high level of confidence in limiting home availability of SSBs and a particular message valence remains unclear. Additional studies are needed to determine how self-efficacy affects motivation based on gain- or loss-framed messages promoting positive parenting practices.

Level of involvement in a specific health issue is another dispositional factor that has been reviewed regarding effectiveness of gain- or loss-framed health messages.[10,11,13] For individuals with low involvement, gain-framed messages were generally more effective than loss-framed messages.[10,13] For the subgroup of parents in the current study with high availability of SSBs at home, involvement in controlling beverage availability for children may be low, consistent with the finding that gain-framed messages were more effective than loss-framed messages in improving motivation.

In the current study, gain-framed compared to loss-framed messages resulted in greater motivation for role modeling beverage intake by all parents, and subgroups by SSB intake and weight status. However, parent beverage intake was assessed as an indication of role modeling, similar to another recent study,[28] and not measured with a general scaled variable. Therefore results based on subgroups by SSB intake may not be consistent with tests of the effectiveness of gain- vs. loss-framed messaging based on other measures of role modeling. Weight status did not operate as a dispositional factor to

moderate effectiveness of gain- vs. loss-framed messages for either parenting practice because there were no differences in effectiveness between normal and overweight/obese parents.

A strength of the current study was the novelty of testing effectiveness of gain- vs. loss-framed health messages to promote multiple behaviors that would benefit someone other than the message recipient. However, only an immediate outcome (motivation) was assessed in this study instead of actual behavior change, thus representing a limitation because of the potential gap between intention/motivation and behavior. Further studies are needed to determine whether gain- compared to loss-framed messages are more effective in influencing actual change in SSB parenting practices and ultimately, child SSB intake. Another limitation was that only a slight majority (56%) of parents perceived the loss-framed message as negative for controlling home beverage availability, possibly because the same photo was used in both the gain- and loss-framed messages. Thus, caution should be used in interpreting the results regarding controlling home beverage availability.

In summary, given the positive findings regarding gain-framed messages and previous research on framing effects in nutrition education,[10] future parent intervention programs may benefit from using gain-framed messages to promote parenting practices aimed at decreasing SSB intake by children.

VII. Supplemental file

Gain-framed Controlling Availability	Loss-framed Controlling Availability
	
Gain-framed Role Modeling	Loss-framed Role Modeling
	

VIII. References (Chapter 5)

1. U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015 – 2020 Dietary Guidelines for Americans*. 8th Edition. December 2015. Available at http://health.gov/dietaryguidelines/2015/guidelines/.
2. Rosinger A, Herrick K, Gahche J, Park S. Sugar-sweetened beverage consumption among US youth, 2011–2014. *NCHS Data Brief* #271. 2017:1-8.
3. Malik VSV, Pan A, Willett WC, Hu FBF. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *Am J Clin Nutr*. 2013;98(4):1084-1102. doi:10.3945/ajcn.113.058362.
4. Berkey C, Rockett H, Field A. Sugar-added beverages and adolescent weight change. *Obesity*. 2004;12:778-788.
5. Newby P, Peterson K, Berkey C, Leppert J. Beverage consumption is not associated with changes in weight and body mass index among low-income preschool children in North Dakota. *J Am Diet Assoc*. 2004;104:1086-1094.
6. Phillips SM, Bandini LG, Naumova EN, Cyr H, Colclough S, Dietz WH, Must A. Energy-dense snack food intake in adolescence: longitudinal relationship to weight and fatness. *Obes Res*. 2004;12(3):461-472. doi:10.1038/oby.2004.52.
7. Vaughn AE, Dearth-Wesley T, Tabak RG, Bryant M, Ward DS. Development of a comprehensive assessment of food parenting practices: the home self-administered tool for Environmental Assessment of Activity and Diet Family Food Practices Survey. *J Acad Nutr Diet*. 2017;117:214-227. doi:10.1016/j.jand.2016.07.021.
8. Vereecken C, Keukelier E, Maes L. Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*. 2004;43:93-

103.

9. Akl EA, Oxman AD, Herrin J, Vist GE, Terrenato I, Sperati F, Costiniuk C, Blank D, Schünemann H. Framing of health information messages. In: *Cochrane Database of Systematic Rev*. 2011;12:. doi:10.1002/14651858.CD006777.pub2.
10. Wansink B, Pope L. When do gain-framed health messages work better than fear appeals? *Nutr Rev*. 2015;73(1):4-11.
11. Rothman AJ, Salovey P. Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychol Bull*. 1997;121(1):3-19. doi:10.1037/0033-2909.121.1.3.
12. Rothman AJ, Martino SC, Bedell BT, Detweiler JB, Salovey P. The systematic influence of gain-and loss-framed messages on interest in and use of different types of health behavior. *Personal Soc Psychol Bull*. 1999;25(11):1355-1369. doi:10.1177/0146167299259003.
13. Covey J. The role of dispositional factors in moderating message framing effects. *Health Psychol*. 2014;33:52-65.
14. Bannon K, Schwartz M. Impact of nutrition messages on children's food choice: Pilot study. *Appetite*. 2006;46:124-129.
15. Satia J, Barlow J, Armstrong-Brown J. A qualitative study to explore Prospect theory and message framing and diet and cancer prevention-related issues among African American adolescents. *Cancer Nurs*. 2010;33:102-109.
16. Wirtz J, Kulpavaropas S. The effects of narrative and message framing on engagement and eating intention among a sample of adult Hispanics. *J Nutr Educ Behav*. 2014;46:396-400.

17. Latimer A, Brawley L. A systematic review of three approaches for constructing physical activity messages: What messages work and what improvements are needed? *Int J Behav Nutr Phys Act*. 2010;7:36.

18. Gallagher KM, Updegraff JA. Health message framing effects on attitudes, intentions, and behavior: a meta-analytic review. *Ann Behav Med*. 2012;43:101-116. doi:10.1007/s12160-011-9308-7.

19. Richards R, Reicks M, Wong SS, Gunther C, Cluskey M, Ballejos MS, Bruhn C, Johnston NP, Misner S, Watters C. Perceptions of how parents of early adolescents will personally benefit from calcium-rich food and beverage parenting practices. *J Nutr Educ Behav*. 2014;46(6):595-601. doi:10.1016/j.jneb.2014.05.010.

20. Vaughn AE, Ward DS, Fisher JO, Faith MS, Hughes SO, Kremers SO, Kremers SP, Musher-Eizenman DR, O'Connor TM, Patrick H, Power TG. Fundamental constructs in food parenting practices: a content map to guide future research. *Nutr Rev*. 2016;74(2):98-117. doi:10.1093/nutrit/nuv061.

21. Gerend MA, Maner JK. Fear, anger, fruits, and veggies: Interactive effects of emotion and message framing on health behavior. *Health Psychol*. 2011;30(4):420-423. doi:10.1037/a0021981.

22. Churchill S, Pavey L. Promoting fruit and vegetable consumption: The role of message framing and autonomy. *Br J Health Psychol*. 2013;18(3):610-622. doi:10.1111/bjhp.12007.

23. Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Prev Med (Baltim)*. 2003;37:198-208.

24. Hedrick V, Savla J, Comber D, Flack K. Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): sugar-sweetened beverages and total beverage energy intake. *J Acad Nutr Diet*. 2012;112:840-849.

25. Nickelson J, Lawrence JC, Parton JM, Knowlden AP, McDermott RJ. What proportion of preschool-aged children consume sweetened beverages? *J Sch Health.* 2014;84:185-194.

26. Tipton JA. Caregivers' psychosocial factors underlying sugar-sweetened beverage intake among non-Hispanic Black preschoolers: an elicitation study. *J Pediatr Nurs*. 2014;29:47-57.

27. Taveras EM, Gortmaker SL, Hohman KH, Horan CM, Kleinman KP, Mitchell K, Price S, Prosser LA, Rifas-Shiman SL, Gillman MW. A randomized controlled trial to improve primary care to present and manage childhood obesity: the High Five for Kids Study. *Arch Pediatr Adolesc Med.* 2011;165:714-722.

28. Heredia NI, Ranjit N, Warren JL, Evans AE. Association of parental social support with energy balance-related behaviors in low-income and ethnically diverse children: a cross-sectional study. *BMC Public Health*. 2016;16:1182.

CHAPTER 6: EFFECTIVENESS OF AN ONLINE NEWSLETTER/TEXT MESSAGE INTERVENTION PROMOTING BEVERAGE-RELATED PARENTING PRACTICES: PILOT TEST RESULTS

Supporting documents are found in Appendices 8.1-8.2, 8.7-8.8

I. Overview

Positive beverage parenting practices may reduce sugar-sweetened beverage consumption by children and prevent potential health problems. An online newsletter/text message intervention was conducted with parents of children 6-12 years to improve beverage parenting practices. Newsletters and text messages were sent weekly over a 4-week period providing gain-framed messages encouraging parenting practices including role modeling and controlling home beverage availability. Pre-post surveys included measures of home availability of beverages and parent beverage intake as an indication of parenting practices. Parents were primarily white, well-educated and female. About one-third lived in rural areas. Results from 100 parents with pre-post data from baseline to 4 weeks showed decreased reported home availability of regular soda pop ($p = 0.008$), decreased parent intake of sweetened beverages ($p = 0.004$), and decreased parent-reported child intake of regular soft drinks ($p = 0.001$) and sweetened juice drink beverages ($p < 0.0001$). Most parents (82%) reported reading all three newsletters and indicated that the information provided was practically useful (93%). A brief newsletter/text message intervention may be an effective and convenient approach to promote positive beverage parenting practices.

Keywords: sugar-sweetened beverages, children, parent newsletters, text message, intervention

II. Introduction

Sugar-sweetened beverages (SSBs) are a substantial source of energy for children and adolescents in the U.S. (Han & Powell, 2013). Studies have shown a consistent relationship between SSB intake among children and weight gain, dyslipidemia, type 2 diabetes, and dental caries (De Ruyter, Olthof, Seidell, & Katan, 2012; Malik, Pan, Willett, & Hu, 2013; Rosinger, Herrick, Gahche, & Park, 2017). Parents play an essential role in influencing child food and beverage beliefs and behaviors through various parenting practices (Hammond, 2010; Watts, Mâsse, Barr, & Lovato, 2014). Parenting practices such as controlling the availability of SSBs and role modeling intake have been associated with child and adolescent SSB intake (Conlon et al., 2015; Riebl, MacDougal, Hill, & Estabrooks, 2016). Social Cognitive Theory has been used to frame behaviors of children and adolescents based on physical environmental factors, such as the availability of foods and beverages, and socio-environmental factors including parent modeling or expectations (Conner & Armitage, 2006). A recent review of interventions to reduce SSB intake showed that few interventions that addressed intake of children involved parents in the intervention effort (Vargas-Garcia et al., 2017), in spite of the influential role that parents play in child beverage intake.

Newsletters have been used in conjunction with other intervention strategies to change nutrition-related behaviors, knowledge, and attitudes among adults (Fey-Yensan, English, & Museler, 2002; Lancaster, Smiciklas-Wright, & Ahern, 1997; Lutz, Ammerman, & Atwood, 1999; Taylor-Davis & Smiciklas-Wright, 2000). These findings suggest a potential role for newsletters as a part of parent education to encourage parenting

practices that promote positive changes in child beverage intake at home. Because many families have busy lifestyles, parents may not be able to attend classes in community settings. Those living in rural areas or with restricted mobility may also have limited access to in-person parent education. Given the high availability of smartphone and computer technology (Pew Research Center, 2016), online communications and text messages are a convenient alternative to in-person classes. These channels may also be cost-effective for educators with limited financial resources.

Studies testing the effectiveness of online newsletters and text messages alone as a brief intervention strategy for parents who may not prefer or have limited access to in-person education are limited. The purpose of this pilot study was to test the effectiveness of a parent online newsletter/text message-based intervention to encourage the parenting practices of controlling home beverage availability of healthful beverages and role modeling healthful beverage intake for children (6-12 years).

III. Materials and Methods

A. Participants

Parents (N = 197) were recruited to participate in a brief newsletter/text message-based intervention in 2016 at the Minnesota State Fair in a building specifically designed for research studies sponsored by the University (Driven to Discover building). Parents were recruited with signage posted online and in the building. Eligibility criteria included having a child (6-12 years), being the primary person responsible for food acquisition and preparation in the home, able to complete pre-post-test surveys in English, and having

access to a computer or a smart phone. Parents/caregivers were given $5 and a backpack after completing the pre-test survey at the Fair, and a $25 gift card after completing the post-test survey one month later at home. The University Institutional Review Board approved this study.

B. Intervention

Online newsletters and text messages were developed for parents based on gain-framed messages promoting the parenting practices of managing home availability of beverages and role modeling (Wansink & Pope, 2014). Newsletter content and activities focused on energy balance and application of the two parenting practices in the selection, consumption, and provision of healthy beverages at home, restaurants, and the grocery store. Parents received three online newsletters per week via email as an attachment in two formats (Pdf and an image) and two text messages per week consistent with the same newsletter themes (over a total of about 4 weeks). The newsletters were designed to attract attention using color and design elements. Readability testing indicated a Flesch-Kincaid grade level of 8.0 (Flesch, 1948).

C. Outcome evaluation

Parents/caregivers completed pre- and post-test surveys to assess home beverage availability, beverage intake as a proxy measure of parental role modeling, and parent-reported child beverage intake. If parents had more than one child in the 6 to 12 year age range, they were asked to select one child and answer all survey questions with that child in mind. Home availability of beverages was measured with 9 questions based on a similar questioning framework for foods available at home that had been used with

parents of adolescents in a previous study (Neumark-Stzainer, Wall, Perry, & Story, 2003). The questions asked "How often would you say these beverages are available in your home?" Beverages included milk, soft drinks, fruit drinks, fruit juice, and water and the response options included 1 = *always* – 4 = *never*).

Parent beverage intakes were assessed using a 15-item beverage questionnaire previously evaluated for validity and reliability (Hedrick, Savla, Comber, & Flack, 2012) as an indication of modeling beverage intakes for children. Hedrick et al. (2012) found that beverage intake measured with the 15-item beverage questionnaire was significantly correlated with intake measured with three 24-hour dietary recalls (SSB R^2=0.69), but not with whole milk. In the current study, beverage items included soft drinks, dairy, fruit juice, water, caffeinated, and energy beverages. Respondents were asked to indicate their usual intake over the past month by indicating how often they consumed the beverage (*never or less than 1 per week, 1/week, 2-3/week, 4-6/week, 1/day 2+/day, 3+/day*) and how much they consumed (*less than 6 oz, 8oz, 12 oz, more than 12 oz*). Items were grouped to construct a variable to assess intake of SSBs (regular soda pop, fruit drinks, and energy and sports drinks). Parents reported intake frequency of five beverages for their child (soft drinks, diet soft drinks, sweetened juice beverage/drink, sports drinks, and energy drinks) (Rockett, Berkey, Field, & Colditz, 2001) using the same response options as those used for adult beverage frequency (Hedrick, Savla, Comber, & Flack, 2012)).

Pre-test surveys were completed on iPads using a Qualtrics platform and took about 5-10 minutes per participant. As part of the pre-test survey, parents were also asked to provide

information about demographic and physical characteristics for themselves (age, gender, ethnicity, race, education, employment, food assistance, self-reported height and weight, zipcode, email address) and their child (age, gender, self-reported height and weight). To complete the post-test survey, parents were sent an email message containing a link to access the survey via a University Qualtrics platform. Additional questions were included to assess whether participants had read the newsletters and their satisfaction with the information in the newsletters.

IV. Data analysis

The Statistical Analysis System software (SAS; version 9.3) was used to analyze all data. For categorical variables, frequency counts were calculated. For continuous variables, means and standard deviations were computed. Differences in home beverage availability were determined using McNemar's paired proportions test. Differences in parent and child beverage intakes from pre- to post-test surveys were determined using Wilcoxon signed rank tests. Statistical significance was assessed at the $p = .05$ level in all analyses.

V. Results

One-hundred and ninety-seven parents completed the pre-test survey and 107 parents completed the post-test survey with 100 parents having usable pre-post survey data. About one-third of the pre-test survey participants reported living in zip codes outside of the seven Twin Cities metropolitan counties (Peterson, 2015). The majority of parents were white (92%) with a small proportion of parents reporting Latino ethnicity or another racial background (2% to 4%) (not shown). The majority had 4-year college degrees

(66%), were women (78%) and were employed full time (72%) (Table 1). Mean age and BMI were 42 years and 24.6 BMI units, respectively. About one-third of the children were 12 years of age. Mean BMI was 19.4 and 55% were girls (Table 1). Almost all parents (96%) reported that the child lived in their home four or more days per week (not shown). No differences were observed in demographic characteristics between parents who completed both a pre and post-test survey and those who only completed the pre-test, with several exceptions. Those who did not complete the post-test survey had a higher BMI ($p = 0.015$), were younger ($p = 0.005$) and less educated ($p = 0.001$), more likely to participate in a food assistance program ($p = 0.001$), and less likely to have the child in the home 4 or more days/week ($p = 0.036$) compared to those who completed both the pre and post-test surveys.

Table 6.1 Baseline demographic and physical characteristics of parents and children[1]

Parents	Mean (SD)
Age n=187	42.4 (7.6)
Body Mass Index (BMI) n=175	24.6 (11.9)
	n (%)
Sex	
Female	152 (78.4)
Male	42 (21.7)
Relationship to child	
Parents	180 (92.3)
Grandparent	5 (2.6)
Aunt or uncle	10 (5.1)
Education	
Have not completed high school/received high school diploma or GED	10 (5.2)
Some college or technical school	56 (28.8)
4-year college, university degree or advanced degree	128 (66.0)
Employment	
Student/ homemaker/ not employed/ retired	25 (12.8)
Employed part-time	29 (15.0)
Employed full-time	140 (72.2)
Food Assistance Programs	
Yes	18 (9.5)
No	171 (90.5)
Children	Mean (SD)
Body Mass Index (BMI) n=192	19.4 (5.4)
	n (%)
Age (years)	
6-8	57 (29.2)
9-12	138 (70.8)

Sex	
Female	87 (44.6)
Male	108 (55.4)

[1]For all variables where frequencies are reported, n = 194 – 195, except for participation in Food Assistance Programs where n = 189.

Changes in parent-reported availability of various beverages at home pre-and post-intervention are shown in Table 2. Parents reported a decrease in availability of regular soda and sports drinks in their home from pre-to post intervention. Bottled water was reported to be usually or always available by 75% of parents after the intervention compared to 68% before the intervention ($p = 0.089$). Sweetened fruit drinks were reported to be usually or always available at home by 18% of parents after the intervention compared to 27% before the intervention ($p = 0.061$).

Table 6.2 Parent-reported availability of beverages at home from pre- to post-intervention[1]

How often are these beverages available in your home?	Pre-survey		Post-survey		
	Always/ Usually	Sometimes/ Never	Always/ Usually	Sometimes/ Never	*P* value[2]
	n (%)				
Whole, 1%, 2% or soy	96 (96.0)	4 (4.0)	99 (99.0)	1 (1.0)	0.083
Flavored milk[3]	6 (6.0)	94 (94.0)	7 (7.0)	93 (93.0)	0.655
Regular soda pop	24 (24.0)	76 (76.0)	13 (13.0)	87 (87.0)	0.008
Diet soda pop	26 (16.0)	74 (74.0)	23 (23.0)	77 (77.0)	0.317
100% fruit juice	52 (52.0)	48 (48.0)	47 (47.0)	53 (53.0)	0.297
Fruit drinks[4]	27 (27.0)	73 (73.0)	18 (18.0)	82 (82.0)	0.061

Blended yogurt drink[5]	19 (19.0)	81 (81.0)	15 (15.0)	85 (85.0)	0.285
Bottled water	68 (68.0)	32 (32.0)	75 (75.0)	25 (25.0)	0.089
Sports drinks[6]	35 (35.0)	65 (65.0)	26 (26.0)	74 (74.0)	0.013
Energy drinks[7]	3 (3.0)	97 (97.0)	3 (3.0)	97 (97.0)	1.000

[1]n = 100 parents for the pre- and post-survey responses.
[2]*P* value based on McNemar's paired proportions test.
[3]Includes chocolate, strawberry or other flavors.
[4]Includes any fruit drink flavor, and lemonade or sweetened tea.
[5]Includes blended yogurt and juice drink or yogurt drink.
[6]Includes drinks like Gatorade™, Powerade™.
[7]Includes drinks like Red Bull™, Monster™.

Changes in parent and child beverage intakes from pre-to post intervention are reported in Table 3. Parents reported a decreased intake of 100% fruit juice ($p = 0.002$), sweetened juice beverage/drink ($p = 0.008$), and sweetened beverages as the grouped variable ($p = 0.004$). They also reported a lower intake of whole milk ($p = 0.001$). From pre- to post-intervention, parent-reported child intake decreased for regular soft drinks ($p = 0.001$), sweetened juice drink ($p = <0.0001$), and sport drinks ($p = 0.001$) (Table 3).

Table 6.3 Parent-reported parent and child beverage intake from pre- to post-intervention[1]

Parent beverage intake	Pre-survey Mean (SD)	Post-survey Mean (SD)	*P* value[2]
Water	30.6 (17.9)	31.4 (16.0)	0.654
100% fruit juice	1.9 (4.1)	0.9 (1.8)	0.002
Sweetened juice beverage/drink	2.5 (7.2)	1.1 (5.0)	0.008
Whole milk	0.3 (1.0)	0.2 (0.7)	0.001

Reduced fat milk (2%)	3.3 (10.8)	2.4 (8.0)	0.528
Low fat/fat free milk	4.6 (9.7)	4.7 (7.8)	0.066
Soft drinks, regular	2.4 (5.7)	1.8 (4.1)	0.119
Diet soft drinks	5.2 (11.0)	6.4 (13.0)	0.415
Energy and sport drinks	1.4 (6.1)	0.9 (3.9)	0.035
Sweetened beverages intake[3]	6.3 (14.4)	3.8 (9.6)	0.004
Child beverage intake			
Soft drinks, regular	1.0 (1.6)	0.6 (1.1)	0.001
Diet soft drinks	0.4 (1.2)	0.4 (1.7)	0.356
Sweetened juice beverage/drink	2.4 (4.2)	1.2 (2.5)	<0.0001
Sport drinks	1.8 (3.9)	0.9 (1.3)	0.001
Energy drinks	0.01 (0.1)	0.2 (2.4)	1.000

[1]n = 100 parents for the pre- and post-survey responses.
[2]*P* value based on Wilcoxon signed rank tests.
[3]Sweetened beverages intake = sweetened juice beverage/drink + soft drinks, regular + energy and sports drinks.

Most parents (82%) reported reading all three newsletters, with 75% reporting that they skimmed through each newsletter. Parents also answered specific questions regarding the content of each newsletter as an indication of whether they had read the newsletters. For example, one question asked parents to match beverages (2% low-fat milk, water, regular soda, 1% low-fat milk, sweetened ice tea, 100% fruit juice, fat-free milk, whole milk, fruit drinks, lemonade) to one of three categories: GO beverages (lowest in sugar), SLOW beverages (higher in added sugar and calories), or WHOA beverages (highest in added sugar and calories). The majority of parents correctly matched all of the beverages to their respective categories, except for whole milk where there were mixed results.

Overall, parents rated the newsletters positively with 71% of parents rating their satisfaction with the practicality and helpfulness of the information presented in the newsletters from fair to very good. The majority of parents (93%) felt that the newsletters effectively provided information important to their needs.

VI. Discussion

The results of this pilot study showed that a brief parent online newsletter/text message-based intervention approach was effective in encouraging the parenting practices of controlling home beverage availability of beverages and role modeling beverage intake for children based on parent-reported changes in home beverage availability and intake. These results indicate that the use of the online newsletter/text message approach may be appropriate for an audience of parents who may not prefer or have access or time to attend in-person classes.

Several factors may explain the positive effects observed on reported intakes and availability related to parenting practices. Gain-framed messages were used in the newsletters and text messages instead of loss-framed messages. In previous studies, gain-framed messages were favorable for motivating prevention behaviors including eating and exercising (Wansink & Pope, 2014; Rothman & Salovey, 1997; Rothman, Martino, Bedell, Detweiler, & Salovey, 1999). In addition, most parents indicated that the information in the newsletter met their needs and were satisfied with the practicality of the information, which might have contributed to the positive outcomes. Furthermore,

75% of parents indicated they scanned each newsletter with confirmation based on accurate responses to specific questions regarding the content of each newsletter.

The positive findings regarding changes in beverage intakes and availability are consistent with several other studies using newsletters as an intervention strategy with parents. Parental newsletters were used in a school-based intervention trial to motivate parents to help children change sedentary behavior over a period of 6 months (Robinson, 1999). Children in the intervention groups reported less time watching TV and playing fewer computer/videogames than control group. Another study used parent newsletters to promote home availability and accessibility of fruits and vegetables (Bere, Veierød, & Bjelland, 2006). Children whose parents reported the highest usage of newsletters had higher fruit and vegetable intakes compared to children whose parents had the lowest usage at 8 and 20 months follow-up. These studies used newsletters along with other intervention components over a longer period as recommended to influence behavior change (Smedley & Syme, 2001), however in the current study newsletters and text messages were used alone for a relatively brief period. Additional studies are necessary to clarify the relationship between dose and duration of parent interventions to promote parenting practices that influence child intake and activity.

Methods to assess role-modeling behaviors of parents have varied across studies. In the current study, role modeling was considered a reflection of parent intake, consistent with other studies (Bauer, Neumark-Stzainer, Fulkerson, Hannan, & Story, 2011; Pinard, Davey, & Estabrooks, 2011). A scaled variable to measure parent's reported role

modeling behaviors may have resulted in different outcomes (Draxton, Fulkerson, Friend, Flattum, & Schow, 2014; Palfreyman, Haycraft, & Meyer, 2014; Tibbs et al., 2001).

Only about half of the parents who completed a pre-survey also completed a post-survey, thus limiting the sample size in the current study. However, even with the reduced sample size, significant positive differences were observed in parent and child beverage intakes and home beverage availability as reported by parents. Nevertheless, parents who completed the pre- and post-survey had a lower BMI, were older, more educated, and less likely to participate in a food assistance programs compared to those who did not complete the post-survey. Therefore, results cannot be generalized to a broader audience and could differ by parent characteristics. Future studies could use the results from this pilot study to replicate the intervention with a larger and more diverse audience based on education level, income, race/ethnicity, and urban versus rural place of residence.

VII. References (Chapter 6)

Bauer, K. W., Neumark-Sztainer, D., Fulkerson, J. A., Hannan, P. J., & Story, M. (2011). Familial correlates of adolescent girls' physical activity, television use, dietary intake, weight, and body composition. *International Journal of Behavioral Nutrition and Physical Activity, 8,* 25. doi:10.1186/1479-5868-8-25.

Bere, E., Veierød, M., & Bjelland, M. (2006). Outcome and process evaluation of a Norwegian school-randomized fruit and vegetable intervention: Fruits and Vegetables Make the Marks (FVMM). *Health Education Research, 21,* 258-267.

Conlon, B. A., McGinn, A. P., Lounsbury, D. W., Diamantis, P. M., Groisman-Perelstein, A.E., Wylie-Rosett, J., & Isasi, C. R. (2015). The role of parenting practices in the home environment among underserved youth. *Childhood Obesity, 11,* 394-405. doi: 10.1089/chi.2014.0093.

Conner, M., & Armitage, C. Social psychological models of food choice. In *The Psychology of Food Choice*. Cambridge, MA: CABI, 2006:41e57.

De Ruyter, J. C., Olthof, M. R., Seidell, J. C., & Katan, M. B. (2012). A trial of sugar-free or sugar-sweetened beverages and body weight in children. *New England Journal of Medicine, 367,* 1397-1406. doi:10.1056/NEJMoa1203034.

Draxten, M., Fulkerson, J. A., Friend, S., Flattum, C. F., & Schow, R. (2014). Parental role modeling of fruits and vegetables at meals and snacks is associated with children's adequate consumption. *Appetite, 78,* 1-7. doi:10.1016/j.appet.2014.02.017.

Fey-Yensan, N., English, C., Museler, H. (2002). Evaluation of a nutrition education newsletter for home-delivered meal participants. *Journal of Nutrition for the Elderly, 21,* 39-60.

Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology, 32*, 221-233.

Hammond, R. (2010). Social influence and obesity. *Current Opinion in Endocrinology, Diabetes and Obesity, 17,* 467-471. doi: 10.1097/MED.0b013e32833d4687.

Han, E., Powell, L. (2013). Consumption patterns of sugar-sweetened beverages in the United States. *Journal of the Academy of Nutrition and Dietetics, 113,* 43-53. doi: 10.1016/j.jand.2012.09.016

Hedrick, V., Savla, J., Comber, D., & Flack, K. (2012). Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): sugar-sweetened beverages and total beverage energy intake. *Journal of the Academy of Nutrition and Dietetics, 112*, 840-849. doi: 10.1016/j.jand.2012.01.023

Lancaster, K., Smiciklas-Wright, H., & Ahern, F. (1997). Evaluation of a nutrition newsletter by older adults. *Journal of Nutrition Education, 29,* 145-151.

Lutz, S., Ammerman, A., & Atwood, J. (1999). Innovative newsletter interventions improve fruit and vegetable consumption in healthy adults. *Journal of the American Dietetic Association, 99,* 705-709.

Malik, V. S. V., Pan, A., Willett, W. C., & Hu, F. B. F. (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *American Journal of Clinical Nutrition, 98*, 1084-1102. doi:10.3945/ajcn.113.058362.

Neumark-Sztainer, D., Wall, M., Perry, C., & Story, M. (2003). Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Preventive Medicine (Baltimore), 37,* 198-208.

Palfreyman, Z., Haycraft, E., & Meyer, C. (2014). Development of the Parental

Modelling of Eating Behaviours Scale (PARM): links with food intake among children and their mothers. *Maternal Child Nutrition, 10,* 617-629. doi:10.1111/j.1740-8709.2012.00438.x.

Peterson, M. A Greater Understanding of Greater Minnesota (and Metro Areas). https://mn.gov/admin/demography/news/ada-to-zumbrota-blog/?id=36-245952. Published 2015.

Pew Research Center. Demographics of Mobile Device Ownership and Adoption in the United States. http://www.pewinternet.org/fact-sheet/mobile/#. Published 2016.

Pinard, C. A., Davy, B. M., & Estabrooks, P. A. (2011). Beverage intake in low-income parent–child dyads. *Eating Behaviors, 12,* 313-316. doi:10.1016/j.eatbeh.2011.07.012.

Riebl, S., MacDougal, C., Hill, C., & Estabrooks, P. (2016). Beverage choices of adolescents and their parents using the theory of planned behavior: a mixed methods analysis. *Journal of the Academy of Nutrition and Dietetics, 116,* 226-239.

Robinson, T. (1999). Reducing children's television viewing to prevent obesity: a randomized controlled trial. *Journal of the American Medical Association, 282,* 1561-1567.

Rockett, H., Berkey, C., Field, A., & Colditz, G. (2001).Cross-sectional measurement of nutrient intake among adolescents in 1996. *Preventive Medicine (Baltimore), 33,* 27-37.

Rosinger, A., Herrick, K., Gahche, J., & Park, S. (2017). Sugar-sweetened beverage consumption among US youth, 2011–2014. *NCHS Data Brief. 271* https://stacks.cdc.gov/view/cdc/44039/cdc_44039_DS1.pdf.

Rothman, A. J., Martino, S. C., Bedell, B. T., Detweiler, J. B., & Salovey, P. (1999). The systematic influence of gain-and loss-framed messages on interest in and use of different

types of health behavior. *Personalality and Social Psychology Bulletin, 25,* 1355-1369. doi:10.1177/0146167299259003.

Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychology Bulletin, 121*, 3-19. doi:10.1037/0033-2909.121.1.3.

Smedley, B., & Syme, S. (2001). Promoting health: intervention strategies from social and behavioral research. *American Journal of Health Promotion, 15*, 149-166.

Tibbs, T., Haire-Joshu, D., Schechtman, K. B., Brownson, R. C., Nanney, M. S., Houston, C., & Auslander, W. (2001). The relationship between parental modeling, eating patterns, and dietary intake among African-American parents. *Journal of the American Dietetic Association, 101*, 535-541. doi:10.1016/S0002-8223(01)00134-1.

Taylor-Davis, S., & Smiciklas-Wright, H. (2000). Responses of older adults to theory-based nutrition newsletters. *Journal of the American Dietetic Association, 100,* 656-664.

Vargas-Garcia, E. J., Evans, C. E. L., Prestwich, A., Sykes-Muskett, B. J., Hooson, J., & Cade, J. E. (2017). Interventions to reduce consumption of sugar-sweetend beverages or increase water intake: evidence from a systematic review and meta-analysis. *Obesity Reviews,* Jul 18. doi: 10.1111/obr.12580. [Epub ahead of print]

Wansink, B., & Pope, L. (2014). When do gain-framed health messages work better than fear appeals? *Nutrition Reviews, 73*, 4-11.

Watts, A., Mâsse, L., Barr, S., & Lovato, C. (2014). Parent–child associations in selected food group and nutrient intakes among overweight and obese adolescents. *Journal of the Academy of Nutrition and Dietetics, 114*, 1580-1586. doi: 10.1016/j.jand.2014.04.018.

CHAPTER 7: COMPLETE LIST OF REFERENCES FOR DISSERTATION

Ahima RS, Lazar MA. The health risk of obesity—better metrics imperative. Science. 2013;341(6148):856-858.

Ajzen I. The theory of planned behavior. Organ Behav Hum Decis. 1991;50(2):179-211.

Akl EA, Oxman AD, Herrin J, Vist GE, Terrenato I, Sperati F, Costiniuk C, Blank D, Schünemann H. Framing of health information messages. In: Cochrane Database of Systematic Rev. 2011;12:. doi:10.1002/14651858.CD006777.pub2.

Ambrosini GL, Oddy WH, Huang RC, Mori TA, Beilin LJ, Jebb SA. Prospective associations between sugar-sweetened beverage intakes and cardiometabolic risk factors in adolescents. Am J Clin Nutr. 2013;98(2):327-334. doi:10.3945/ajcn.112.051383

Arcan C, Neumark-Sztainer D, Hannan P, van den Berg P, Story M, Larson N. Parental eating behaviours, home food environment and adolescent intakes of fruits, vegetables and dairy foods: longitudinal findings from Project EAT. Public Health Nutr. 2007;10(11):1257-1265. doi:10.1017/S1368980007687151.

Bandura, A. Social Foundations of Thought and Action: A Social Cognitive Perspective. Princeton-Hall: Englewood Cliffs, NJ, USA, 1986.

Bannon K, Schwartz MMB. Impact of nutrition messages on children's food choice: Pilot study. Appetite. 2006;46(2):124-129. doi:10.1016/j.appet.2005.10.009.

Bauer KW, Neumark-Sztainer D, Fulkerson JA, Hannan PJ, Story M. Familial correlates of adolescent girls' physical activity, television use, dietary intake, weight, and body composition. Int J Behav Nutr Phys Act. 2011;8(1):25. doi:10.1186/1479-5868-8-25.

Belcher BR, Berrigan D, Dodd KW, Emken BA, Chou C-P, Spruijt-Metz D. Physical activity in US youth: effect of race/ethnicity, age, gender, and weight status. Med Sci Sports Exerc. 2010;42(12):2211-2221. doi:10.1249/MSS.0b013e3181e1fba9.

Bere E, Veierød M, Bjelland M. Outcome and process evaluation of a Norwegian school-randomized fruit and vegetable intervention: Fruits and Vegetables Make the Marks (FVMM). Health Educ Res. 2006;21(2):258-67.

Bere E, Sørli Glomnes E, te Velde S.J, Klepp K-I. Determinants of adolescents' soft drink consumption. Public Health Nutr. 2008;11: 49–56. doi:10.1017/S1368980007000122.

.

Berkey C, Rockett H, Field A. Sugar-added beverages and adolescent weight change. Obesity Res. 2004;12(5):778-88.

Berrington de Gonzalez A, Hartge P, Cerhan JR, et al. Body-mass index and mortality among 1.46 million white adults. N Engl J Med. 2010;363(23):2211-2219. doi:10.1056/NEJMoa1000367.

Biro FM, Wien M. Childhood obesity and adult morbidities. Am J Clin Nutr. 2010;91(1):1499-1505. doi:10.3945/ajcn.2010.28701B.1.

Bjelland M, Hausken S. Development of family and dietary habits questionnaires: the assessment of family processes, dietary habits and adolescents' impulsiveness in Norwegian adolescents and their parents. Int J Beha Nutr Phys Act.2014;15(11):130.

Bjelland M, Lien N, Grydeland M, Bergh I.H, Anderssen S.A, Ommundsen Y, Klepp K.I, Andersen L.F. Intakes and perceived home availability of sugar-sweetened beverages, fruit and vegetables as reported by mothers, fathers and adolescents in the HEIA (HEalth In Adolescents) study. Public Health Nutr. 2011;14: 2156-2165. doi:10.1017/S1368980011000917.

Bjorge T, Engeland A, Tverdal A, Smith GD. Body mass index in adolescence in relation to cause-specific mortality: a follow-up of 230,000 Norwegian adolescents. Am J Epidemiol. 2008;168(1):30-37. doi:10.1093/aje/kwn096.

Brug J, van Stralen MM, Te Velde SJ, et al. Differences in weight status and energy-balance related behaviors among schoolchildren across Europe: the ENERGY-project. PLoS One. 2012;7(4):e34742. doi:10.1371/journal.pone.0034742.

Campbell K, Abbott G, Spence A, Crawford D. Home food availability mediates associations between mothers' nutrition knowledge and child diet. Appetite. 2013;71:1-6.

Cawley J, Meyerhoefer C. The medical care costs of obesity: An instrumental variables approach. J Health Econ. 2012;31(1):219-230. doi:10.1016/j.jhealeco.2011.10.003.

Centers for Disease Control and Prevention. Defining Childhood Obesity | Overweight & Obesity | CDC. https://www.cdc.gov/obesity/childhood/defining.html. Published 2016.

Centers for Disease Control and Prevention. Does drinking beverages with added sugars increase the risk of overweight? https://www.cdc.gov/nccdphp/dnpa/nutrition/pdf/r2p_sweetend_beverages.pdf. Published 2006.

Chou S-Yi, Rashad I, Grossman M. Fast-food restaurant advertising on television and its influence on childhood obesity. J Law Econ. 2008;51(4):599-618.

Churchill S, Pavey L. Promoting fruit and vegetable consumption: The role of message framing and autonomy. Br J Health Psychol. 2013;18(3):610-622. doi:10.1111/bjhp.12007.

Cluskey M, Auld G, Edlefsen M, Zaghloul S, Bock M, Bourshey C.J, Bruhn C, Goldberg D, Misner S, Olson B, Reicks M. Calcium knowledge, concern, and expectations for intake among parents of Asian, Hispanic and non-Hispanic white early adolescents. Forum Fam Consumer Issues. 2010;13(3).

Conlon BBA, McGinn APA, Lounsbury DDW, et al. The role of parenting practices in the home environment among underserved youth. Child Obes. 2015; 11(4):394-405. doi:10.1089/chi.2014.0093..

Conner M, Armitage C. Social psychological models of food choice. In the Psychology of Food Choice. Cambridge, MA: CABI, 2006:41e57.

Courtenay WH, Mccreary D.R, Merighi J.R. Gender and ethnic differences in health beliefs and behaviors. J Health Psychol. 2002;7: 219-231. doi:10.1177/1359105302007003216.

Covey J. The role of dispositional factors in moderating message framing effects. Health Psychol. 2014;33:52-65.

Cuenca-García M, Ortega FB, Ruiz JR, et al. Combined influence of healthy diet and active lifestyle on cardiovascular disease risk factors in adolescents. Scand J Med Sci Sports. 2014;24(3):553-562. doi:10.1111/sms.12022.

De Coen V, Vansteelandt S, Maes L, Huybrechts I, De Bourdeaudhuij I, Vereecken C. Parental socioeconomic status and soft drink consumption of the child. The mediating proportion of parenting practices. Appetite. 2012;59: 76-80. doi:10.1016/j.appet.2012.03.024.

De Craemer M, De Decker E, De Bourdeaudhuij I, Vereecken C, Deforche B, Manios Y, Cardon G. Correlates of energy balance-related behaviours in preschool children: a systematic review. Obesity Rev. 2012;13:13-28.

De Ruyter J.C, Olthof M.R, Seidell J.C, Katan M.B. A trial of sugar-free or sugar-sweetened beverages and body weight in children. N Engl J Med. 2012;367:1397-1406. doi:10.1056/NEJMoa1203034.

de Sousa AGP, Cercato C, Mancini MC, Halpern A. Obesity and obstructive sleep apnea-hypopnea syndrome. Obes Rev. 2008;9(4):340-354. doi:10.1111/j.1467-789X.2008.00478.x.

Demory-Luce D, Morales M, Nicklas T, Baranowski T, Zakeri I, Berenson G. Changes in food group consumption patterns from childhood to young adulthood: The Bogalusa Heart Study. J Am Diet Assoc. 2004;104(11):1684-1691. doi:10.1016/j.jada.2004.07.026.

Diamant A, Babey S, Jones M. Teen dietary habits related to those of parents. Policy Brief UCLA Cent Health Policy Res. 2009;(PB2009-2):1-6.

Dixon LB, Pellizzon MA, Jawad AF, Tershakovec AM. Calcium and dairy intake and measures of obesity in hyper- and normocholesterolemic children. Obes Res. 2005;13(10):1727-1738. doi:10.1038/oby.2005.211.

Draxten M, Fulkerson JA, Friend S, Flattum CF, Schow R. Parental role modeling of fruits and vegetables at meals and snacks is associated with children's adequate consumption. Appetite. 2014;78:1-7. doi:10.1016/j.appet.2014.02.017.

Dror DK, Allen LH. Dairy product intake in children and adolescents in developed countries: trends, nutritional contribution, and a review of association with health outcomes. Nutr Rev. 2014;72(2):68-81. doi:10.1111/nure.12078. .

Ebbeling CB, Feldman HA, Chomitz VR, et al. A randomized trial of sugar-sweetened beverages and adolescent body weight. N Engl J Med. 2012;367:1407-1416. doi:10.1056/NEJMoa1203388.

Emond JA, Smith ME, Mathur SJ, Sargent JD, Gilbert-Diamond D. Children's food and beverage promotion on television to parents. Pediatrics. 2015; 136(6):1095-102.

Ezendam N, Evans A, Stigler M. Cognitive and home environmental predictors of change in sugar-sweetened beverage consumption among adolescents. Br J Nutr. 2010;103(5):768-74.

Faith MS, Dennison BA, Edmunds LS, Stratton HH. Fruit juice intake predicts increased adiposity gain in children from low-income families: weight status-by-environment interaction. Pediatrics. 2006;118(5):2066-2075. doi:10.1542/peds.2006-1117.

Fakhouri THI, Hughes JP, Brody DJ, Kit BK, Ogden CL. Physical activity and screen-time viewing among elementary school–aged children in the united states from 2009 to 2010. JAMA Pediatr. 2013;167(3):223. doi:10.1001/2013.jamapediatrics.122.

Farley T.A, Halper H.S, Carlin A.M, Emmerson E.M, Foster K.N, Fertig F.R. Mass media campaign to reduce consumption of sugar-sweetened beverages in a rural area of the United States. Am. J Public Health. 2017;107: 989-995.

Fernández-Alvira JM, te Velde SJ, De Bourdeaudhuij I, et al. Parental education associations with children's body composition: mediation effects of energy balance-related behaviors within the ENERGY-project. Int J Behav Nutr Phys Act. 2013;10:80. doi:10.1186/1479-5868-10-80.

Fey-Yensan N, English C, Museler H. Evaluation of a nutrition education newsletter for home-delivered meal participants. Journal of Nutrition for the Elderly. 2002;34(1):569-70.

Field AE, Gillman MW, Rosner B, Rockett HR, Colditz GA. Association between fruit and vegetable intake and change in body mass index among a large sample of children and adolescents in the United States. Int J Obes. 2003;27(7):821-826. doi:10.1038/sj.ijo.0802297.

Fiorito LM, Marini M, Francis LA, Smiciklas-Wright H, Birch LL. Beverage intake of girls at age 5 y predicts adiposity and weight status in childhood and adolescence. Am J Clin Nutr. 2009;90(4):935-942. doi:10.3945/AJCN.2009.27623.

Fisher J.O, Mitchell D.C, Smiciklas-Wright, H, Mannino M.L, Birch L.L. Meeting calcium recommendations during middle childhood reflects mother-daughter beverage choices and predicts bone mineral status. Am J Clin Nutr. 2004;*79*: 698-706.

Fisher J, Mitchell D, Smiciklas-Wright H, Birch L. Maternal milk consumption predicts the tradeoff between milk and soft drinks in young girls' diets. J Nutr. 2001;131(2):246-250.

Ford CN, Ng SW, Popkin BM. Ten-year beverage intake trends among US preschool children: rapid declines between 2003 and 2010 but stagnancy in recent years. Pediatr Obes. 2016;11(1):47-53. doi:10.1111/ijpo.12019.

Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. Risk factors and adult body mass index among overweight children: the Bogalusa heart study. Pediatrics. 2009;123(3):750-7.

French SA, Gerlach AF, Mitchell NR, Hannan PJ, Welsh EM. Household obesity prevention: take action—a group-randomized trial. Obesity. 2011;19(10):2082-2088. doi:10.1038/oby.2010.328.

French SA, Sherwood NE, Jaka MM, Haapala JL, Ebbeling CB, Ludwig DS. Physical changes in the home environment to reduce television viewing and sugar-sweetened beverage consumption among 5- to 12-year-old children: a randomized pilot study. Pediatr Obes. 2016;11(5):e12-e15. doi:10.1111/ijpo.12067.

Fulgoni VL, Quann EE. National trends in beverage consumption in children from birth to 5 years: analysis of NHANES across three decades. Nutrition J. 2012;11(1): 92.

Furnham A, Hrkcaldy B. Age and sex differences in health beliefs and behaviours. Psychol Rep. 1997;80: 63-66. doi:10.2466/pr0.1997.80.1.63.

Gallagher KM, Updegraff JA. Health message framing effects on attitudes, intentions, and behavior: a meta-analytic review. Ann Behav Med. 2012;43:101-116. doi:10.1007/s12160-011-9308-7.

Galson SK. Childhood overweight and obesity prevention. Public Health Rep. 2008;123(3):258-259. doi:10.1177/003335490812300302.

Gerend MA, Maner JK. Fear, anger, fruits, and veggies: Interactive effects of emotion and message framing on health behavior. Health Psychol. 2011;30(4):420-423. doi:10.1037/a0021981.

Gerend MA, Shepherd MA. When different message frames motivate different routes to the same health outcome. Ann Behav Med. 2016;50(2):319-329. doi:10.1007/s12160-015-9757-5.

Gibson EL, Kreichauf S, Wildgruber A, et al. A narrative review of psychological and educational strategies applied to young children's eating behaviours aimed at reducing obesity risk. Obes Rev. 2012;13(s1):85-95. doi:10.1111/j.1467-789X.2011.00939.x.

Goh DYT, Jacob A. Children's consumption of beverages in Singapore: Knowledge, attitudes and practice. J Paediatr Child Health. 2011;47(7):465-472. doi:10.1111/j.1440-1754.2010.01999.x.

Gurnani M, Birken C, Hamilton J. Childhood obesity: causes, consequences, and management. Pediatr Clin North Am. 2015; 62(4):821-40. doi: 10.1016/j.pcl.2015.04.001

Gray WN, Kahhan NA, Janicke DM. Peer victimization and pediatric obesity: A review of the literature. Psychol Sch. 2009;46(8):720-727. doi:10.1002/pits.20410.

Grimm G, Harnack L, Story M. Factors associated with soft drink consumption in school-aged children. J Am Diet Assoc. 2004;104(8):1244-9.

Grosso G, Mistretta A, Turconi G, Cena H, Roggi C, Galvano F. Nutrition knowledge and other determinants of food intake and lifestyle habits in children and young adolescents living in a rural area of Sicily, South Italy. Public Health Nutr. 2013;16(10):1827-1836. doi:10.1017/S1368980012003965.

Gullotta T P, Ma M, Gullotta TP, Blau GM. *Handbook of childhood behavioral issues: evidence-based approaches to prevention and treatment*.New York; Routledge;2008.

Gunther CW, Rose AM, Bruhn C, et al. Parents' calcium knowledge is associated with parental practices to promote calcium intake among parents of early adolescent children. J Extension. 2015, 53.

Hammond R. Social influence and obesity. Curr Opin Endocrinol Diabetes Obes. 2010;17 (5), 467-71. doi: 10.1097/MED.0b013e32833d4687.

Han E, Powell L. Consumption patterns of sugar-sweetened beverages in the United States. J Acad Nutr Diet. 2013;113(1):43-53. doi: 10.1016/j.jand.2012.09.016

Hanson NI, Neumark-Sztainer D, Eisenberg ME, Story M, Wall M. Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables and dairy foods. Public Health Nutr. 2005;8(1):77-85. doi:10.1079/PHN2004661.

Harris JL, Bargh JA, Brownell KD. Priming effects of television food advertising on eating behavior. Health Psychol. 2009;28(4):404-413. doi:10.1037/a0014399.

Harris TS, Ramsey M. Paternal modeling, household availability, and paternal intake as predictors of fruit, vegetable, and sweetened beverage consumption among African American children. Appetite. 2015;85:171-177. doi:10.1016/j.appet.2014.11.008.

Harrist AW, Swindle TM, Hubbs-Tait L, Topham GL, Shriver LH, Page MC. The social and emotional lives of overweight, obese, and severely obese children. Child Dev. 2016;87(5):1564-1580. doi:10.1111/cdev.12548.

Harrist AW, Topham GL, Hubbs-Tait L, Page MC, Kennedy TS, Shriver LH. What developmental science can contribute to a transdisciplinary understanding of childhood obesity: an interpersonal and intrapersonal risk model. Child Dev Perspect. 2012;6(4):445-455. doi:10.1111/cdep.12004.

Hedrick V, Savla J, Comber D, Flack K. Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): sugar-sweetened beverages and total beverage energy intake. J Acad Nutr Diet. 2012;112(6):840-9. doi: 10.1016/j.jand.2012.01.023

Hennessy M, Bleakley A, Piotrowski JT, Mallya G, Jordan A. Sugar-sweetened beverage consumption by adult caregivers and their children. Health Educ Behav. 2015;42(5):677-686. doi:10.1177/1090198115577379.

Heredia NI, Ranjit N, Warren JL, Evans AE. Association of parental social support with energy balance-related behaviors in low-income and ethnically diverse children: a cross-sectional study. BMC Public Health. 2016;16:1182.

Hoppe C, Mølgaard C, Michaelsen KF. Cow's milk and linear growth in industrialized and developing countries. Annu Rev Nutr. 2006;26(1):131-173. doi:10.1146/annurev.nutr.26.010506.103757.

Jeffreys M, Davey Smith G, Martin RM, Frankel S, Gunnell D. Childhood body mass index and later cancer risk: A 50-year follow-up of the Boyd Orr study. Int J Cancer. 2004;112(2):348-351. doi:10.1002/ijc.20423.

Jiménez-Pavón D, Kelly J, Reilly JJ. Associations between objectively measured habitual physical activity and adiposity in children and adolescents: systematic review. Int J Pediatr Obes. 2010;5(1):3-18. doi:10.3109/17477160903067601..

Kaufman FR. Type 2 diabetes mellitus in children and youth: a new epidemic. J Pediatr Endocrinol Metab. 2002;15(Supplement):737-744. doi:10.1515/JPEM.2002.15.S2.737.

Keller KL, Kirzner J, Pietrobelli A, St-Onge M-P, Faith MS. Increased sweetened beverage intake is associated with reduced milk and calcium intake in 3- to 7-year-old children at multi-item laboratory lunches. J Am Diet Assoc. 2009;109(3):497-501. doi:10.1016/j.jada.2008.11.030.

Kelsey MM, Zaepfel A, Bjornstad P, Nadeau KJ. Age-related consequences of childhood obesity. Gerontology. 2014;60(3):222-228. doi:10.1159/000356023.

Kim SA, Moore L V, Galuska D, et al. Vital signs: fruit and vegetable intake among children - United States, 2003-2010. MMWR Morb Mortal Wkly Rep. 2014;63(31):671-676.

Körner A, Kratzsch J, Gausche R, et al. Metabolic syndrome in children and adolescents – risk for sleep-disordered breathing and obstructive sleep-apnea syndrome? Arch Physiol Biochem. 2008;114(4):237-243. doi:10.1080/13813450802306685.

Kosova E, Auinger P, Bremer A. The relationships between sugar-sweetened beverage intake and cardiometabolic markers in young children. J Acad Nutr Diet. 2013;113(2):219-227.

Kriska A, Delahanty L, Edelstein S, et al. Sedentary behavior and physical activity in youth with recent onset of type 2 diabetes. Pediatrics. 2013;131(3): e850-e856

Kunin-Batson, A.; Seburg, E.; Crain, A. Household factors, family behavior patterns, and adherence to dietary and physical activity guidelines among children at risk for obesity. J Nutr. 2015, 47, 206-215.

Lancaster K, Smiciklas-Wright H, Ahern F. Evaluation of a nutrition newsletter by older adults. J Nutr Educ Behav. 1997;29(3):145-151.

LaRowe TL, Moeller SM, Adams AK. Beverage patterns, diet quality, and body mass index of US preschool and school-aged children. J Am Diet Assoc. 2007;107(7):1124-1133. doi:10.1016/j.jada.2007.04.013.

Larson N, Ward D, Neelon S, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. J Am Diet Assoc. 2011;111(9):1343-62.

Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. J Am Diet Assoc. 2006, 106, 1816-1824. doi:10.1016/j.jada.2006.08.018.

Lasater G, Piernas C, Popkin BM. Beverage patterns and trends among school-aged children in the US, 1989-2008. Nutr J. 2011;10(1):103. doi:10.1186/1475-2891-10-103.

Latimer A, Brawley L. A systematic review of three approaches for constructing physical activity messages: What messages work and what improvements are needed? Int J Behav Nutr Phys Act. 2010;7:36.

Ledoux TA, Hingle MD, Baranowski T. Relationship of fruit and vegetable intake with adiposity: a systematic review. Obes Rev. 2011;12(5):e143-e150. doi:10.1111/j.1467-789X.2010.00786.x.

Lee S, Reicks M. Environmental and behavioral factors are associated with the calcium intake of low-income adolescent girls. J Am Diet Assoc. 2003;103:1526-1529. doi:10.1016/j.jada.2003.08.020.

Lien N, Bjelland M, Bergh IH, et al. Design of a 20-month comprehensive, multicomponent school-based randomised trial to promote healthy weight development among 11-13 year olds: The HEalth In Adolescents study. Scand J Public Health. 2010;38(5_suppl):38-51. doi:10.1177/1403494810379894.

Loh DA, Moy FM, Zaharan NL, Jalaludin MY, Mohamed Z. Sugar-sweetened beverage intake and its associations with cardiometabolic risks among adolescents. Pediatr Obes. 2017;12(1):e1-e5. doi:10.1111/ijpo.12108.

Lohman T, Roache A, Martorell R. Anthropometric standardization reference manual. Med Sci Sports Exercise. 1992:24: 952.

Loprinzi PD, Lee I-M, Andersen RE, Crespo CJ, Smit E. Association of concurrent healthy eating and regular physical activity with cardiovascular disease risk factors in U.S. youth. Am J Health Promot. 2015;30(1):2-8. doi:10.4278/ajhp.140213-QUAN-71.

Lorincz AM, Sukumar S. Molecular links between obesity and breast cancer. Endocr Relat Cancer. 2006;13(2):279-292. doi:10.1677/erc.1.00729.

Lutz S, Ammerman A, Atwood J. Innovative newsletter interventions improve fruit and vegetable consumption in healthy adults. J Am Diet Assoc. 1999;99(6):705-9.

Maffeis C. Aetiology of overweight and obesity in children and adolescents. Eur J Pediatr. 2000;159 Suppl 1:S35-44.

Malik VS, Popkin BM, Bray GA, Després J-P, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. Circulation. 2010;121(11):1356-1364.

Malik VSV, Pan A, Willett WC, Hu FBF. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. Am J Clin Nutr. 2013;98(4):1084-1102. doi:10.3945/ajcn.113.058362.

Marcovecchio M, Chiarelli F, Mohn A. Blood pressure and childhood obesity. Curr Hypertens Rev. 2009;5(4):313-320. doi:10.2174/157340209789587735.

Mathias KC, Slining MM, Popkin BM. Foods and beverages associated with higher intake of sugar-sweetened beverages. Am J Prev Med. 2013;44(4):351-357. doi:10.1016/j.amepre.2012.11.036.

McDonald NC, Brown AL, Marchetti LM, Pedroso MS. U.S. school travel, 2009. Am J Prev Med. 2011;41(2):146-151. doi:10.1016/j.amepre.2011.04.006.

McLeod E, Campbell K, Hesketh K. Nutrition knowledge: a mediator between socioeconomic position and diet quality in Australian first-time mothers. J Am Diet Assoc. 2011;111(5):696-704.

Mesirow MS, Welsh JA. 2015. Changing beverage consumption patterns have resulted in fewer liquid calories in the diets of US children: National Health and Nutrition Examination Survey 2001–2010. J. Acad. Nutr. Diet. 115:559–66.e4.

Michels KB, Mohllajee AP, Roset-Bahmanyar E, Beehler GP, Moysich KB. Diet and breast cancer. Cancer. 2007;109(S12):2712-2749. doi:10.1002/cncr.22654.

Miller G, Merlo C, Demissie Z, Sliwa S, Park S. Trends in beverage consumption among high school students — United States, 2007–2015. MMWR Morb Mortal Wkly Rep. 2017;66(4):112-116. doi:10.15585/mmwr.mm6604a5.

Minnesota Center for Health Statistics. Minnesota Student Survey. http://www.health.state.mn.us/divs/chs/mss/. Published 2016.

Moore LL, Singer MR, Bradlee ML, et al. Intake of fruits, vegetables, and dairy products in early childhood and subsequent blood pressure change. Epidemiology. 2005;16(1):4-11.

Moreno LA, Rodríguez G. Dietary risk factors for development of childhood obesity. Curr Opin Clin Nutr Metab Care. 2007;10(3):336-341. doi:10.1097/MCO.0b013e3280a94f59.

Munsell C, Harris J.L, Sarda V, Schwartz M.B. Parents' beliefs about the healthfulness of sugary drink options: opportunities to address misperceptions. Public Health Nutr. 2016:19: 46-54.

National Recreation and Park Association. Hearts n' Parks - Report of 2004 Magnet Center Performance Data. (2004).

Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. Prev Med (Baltim). 2003;37:198-208.

Newby P, Peterson K, Berkey C, Leppert J. Beverage consumption is not associated with changes in weight and body mass index among low-income preschool children in North Dakota. J Am Diet Assoc. 2004;104(7):1086-94.

Newby PK, Peterson KE, Berkey CS, Leppert J, Willett WC, Colditz GA. Dietary composition and weight change among low-income preschool children. Arch Pediatr Adolesc Med. 2003;157(8):759. doi:10.1001/archpedi.157.8.759.

Nickelson J, Lawrence JC, Parton JM, Knowlden AP, McDermott RJ. What proportion of preschool-aged children consume sweetened beverages? J Sch Health. 2014;84:185-194.

Nicolino M, Villanueva C. What is the risk for childhood obeaity? Rev Prat. 2015; 65(1):1275-7.

Nicklas TA, O'Neil CE, Fulgoni VL. The role of dairy in meeting the recommendations for shortfall nutrients in the American diet. J Am Coll Nutr. 2009;28(sup1):73S-81S. doi:10.1080/07315724.2009.10719807.

Niehoff V. Childhood obesity: A call to action. Bariatric Nursing and Surgical Patient. Care. 2009;4:17–23.

Nielsen SJ, Popkin BM. Changes in beverage intake between 1977 and 2001. Am J Prev Med. 2004;27(3):205-210. doi:10.1016/j.amepre.2004.05.005.

Ogden C, Carroll M FC& FK. Prevalence of obesity among adults and youth: United States, 2011-2014. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. http://c.ymcdn.com/sites/www.acutept.org/resource/resmgr/Critical_EdgEmail/0216-prevalence-of-obesity.pdf. Published 2015.

Ogden CL, Carroll MD, Lawman HG, et al. Trends in obesity prevalence among children and adolescents in the United States, 1988-1994 through 2013-2014. JAMA. 2016;315(21):2292-2299. doi:10.1001/jama.2016.6361.

Ogden C.L, Kit BK, Carroll M.D, Park S. Consumption of sugar drinks in the United States, 2005-2008. NCHS Data Brief. 2011:71. 2008_NCHS_Data_Brief/links/0fcfd50b3c386a2f45000000.pdf.

Palfreyman Z, Haycraft E, Meyer C. Development of the Parental Modelling of Eating Behaviours Scale (PARM): links with food intake among children and their mothers. Matern Child Nutr. 2014;10(4):617-629. doi:10.1111/j.1740-8709.2012.00438.x.

Pan A, Hu FB. Effects of carbohydrates on satiety: differences between liquid and solid food. Curr Opin Clin Nutr Metab Care. 2011;14(4):385-390. doi:10.1097/MCO.0b013e328346df36.

Pan A, Willett W.C, Hu F.B.F. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. Am J Clin Nutr. 2013;98(4):1084-1102. doi:10.3945/ajcn.113.058362.

Park S, Onufrak S, Sherry B, Blanck H. The relationship between health-related knowledge and sugar-sweetened beverage intake among US adults. J Acad Nutr Diet. 2014;114(7):1059-66.

Park S, Blanck H, Sherry B, Brener N. Factors associated with sugar-sweetened beverage intake among United States high school students. J Nutr. 2012;142: 306-312.

Parmenter K, Waller J, Wardle J. Demographic variation in nutrition knowledge in England. Health Educ Res. 2000;15(2):163-174. doi:10.1093/her/15.2.163.

Patrick H, Nicklas T, Hughes SO, Morales M. The benefits of authoritative feeding style: caregiver feeding styles and children's food consumption patterns. Appetite. 2005;44: 243-249.

Peterson M. A Greater Understanding of Greater Minnesota (and Metro Areas). https://mn.gov/admin/demography/news/ada-to-zumbrota-blog/?id=36-245952. Published 2015.

Pew Research Center. Demographics of Mobile Device Ownership and Adoption in the United States. http://www.pewinternet.org/fact-sheet/mobile/#. Published 2016.

Phillips SM, Bandini LG, Naumova EN, Cyr H, Colclough S, Dietz WH, Must A. Energy-dense snack food intake in adolescence: longitudinal relationship to weight and fatness. Obes Res. 2004;12(3):461-472. doi:10.1038/oby.2004.52.

Piernas C, Mendez MA, Ng SW, Gordon-Larsen P, Popkin BM. Low-calorie- and calorie-sweetened beverages: Diet quality, food intake, and purchase patterns of US household consumers. Am J Clin Nutr. 2014;99(3):567-577. doi:10.3945/ajcn.113.072132.

Piernas C, Popkin BM. Trends in snacking among U.S. children. Health Aff (Millwood). 2010;29(3):398-404. doi:10.1377/hlthaff.2009.0666.

Pinard CA, Davy BM, Estabrooks PA. Beverage intake in low-income parent–child dyads. Eat Behav. 2011;12(4):313-316. doi:10.1016/j.eatbeh.2011.07.012.

Pirouznia M. The association between nutrition knowledge and eating behavior in male and female adolescents in the US. Int J Food Sci Nutr. 2001;52(2):127-132. doi:10.1080/09637480020027000-8.

Quann E, Fulgoni V, Auestad N. Consuming the daily recommended amounts of dairy products would reduce the prevalence of inadequate micronutrient intakes in the United States: diet modeling study based on NHANES 2007-2010. Nutr J. 2015;14(90).

Rangan AM, Flood VL, Denyer G, et al. The effect of dairy consumption on blood pressure in mid-childhood: CAPS cohort study. Eur J Clin Nutr. 2012;66(6):652-657. doi:10.1038/ejcn.2011.218.

Ranjit N, Evans M, Byrd-Williams C, Evans A. Dietary and activity correlates of sugar-sweetened beverage consumption among adolescents. Pediatrics. 2010;126: e754.

Reicks M, Ballejos M.E, Goodell L.S, Gunther C, Richards R, Wong S.S, Auld G, Boushey C.J, Bruhn C, Cluskey M, Misner S, Olson B, Zaghloul S. Individual and family correlates of calcium-rich food intake among parents of early adolescent children. J Am Diet Assoc. 2011;111:376-384. doi:10.1016/j.jada.2010.11.020.

Reicks M, Degeneffe D, Ghosh K, Bruhn C, Goodell L.S, Gunther C, Auld G, Ballejos M, Boushey C, Cluskey M, Misner S, Olson B, Wong S, Zaghloul S. Parent calcium-rich-food practices/perceptions are associated with calcium intake among parents and

their early adolescent children. Public Health Nutr. 2012;15: 331-340. doi:10.1017/S1368980011001133.

Rey-López JP, Vicente-Rodríguez G, Biosca M, Moreno LA. Sedentary behaviour and obesity development in children and adolescents. Nutr Metab Cardiovasc Dis. 2008;18(3):242-251. doi:10.1016/j.numecd.2007.07.008.

Richards R, Reicks M, Wong SS, Gunther C, Cluskey M, Ballejos MS, Bruhn C, Johnston NP, Misner S, Watters C. Perceptions of how parents of early adolescents will personally benefit from calcium-rich food and beverage parenting practices. J Nutr Educ Behav. 2014;46(6):595-601. doi:10.1016/j.jneb.2014.05.010.

Riebl S, MacDougal C, Hill C, Estabrooks P. Beverage choices of adolescents and their parents using the theory of planned behavior: a mixed methods analysis. J Acad Nutr Diet. 2016;116(2):226-39.

Roberto C, Wong D, Musicus A, Hammond D. The influence of sugar-sweetened beverage health warning labels on parents' choices. *Pediatrics*. 2016;137 (2):e20153185. doi: 10.1542/peds.2015-3185.

Rockett H, Berkey C, Field A, Colditz G. Cross-sectional measurement of nutrient intake among adolescents in 1996. Prev Med (Baltim). 2001;33(1):27-37.

Rose DP, Komninou D, Stephenson GD. Obesity, adipocytokines, and insulin resistance in breast cancer. Obes Rev. 2004;5(3):153-165. doi:10.1111/j.1467-789X.2004.00142.x.

Rosenkranz R. Model of the home food environment pertaining to childhood obesity. Nutr Rev. 2008;66(3):123-40.

Rosinger A, Herrick K, Gahche J, Park S. Sugar-sweetened beverage consumption among US youth, 2011–2014. NCHS Data Brief. 2017. Available online: https://stacks.cdc.gov/view/cdc/44039/cdc_44039_DS1.pdf.

Ross A.C, Taylor C.L, Yaktine A.L, Del Valle H.B. Dietary Reference Intakes for Calcium and Vitamin D. Food and Nutrition Board, Institute of Medicine. Washington, DC; 2010.

Rothman AJ, Martino SC, Bedell BT, Detweiler JB, Salovey P. The systematic influence of gain-and loss-framed messages on interest in and use of different types of health behavior. Personal Soc Psychol Bull. 1999;25(11):1355-1369. doi:10.1177/0146167299259003.

Rothman AJ, Salovey P. Shaping perceptions to motivate healthy behavior: The role of message framing. Psychol Bull. 1997;121(1):3-19. doi:10.1037/0033-2909.121.1.3.

Santiago-Torres M, Adams A, Carrel A. Home food availability, parental dietary intake, and familial eating habits influence the diet quality of urban Hispanic children. Childhood Obes. 2014;10(5):408-415.

Satia J, Barlow J, Armstrong-Brown J. A qualitative study to explore Prospect theory and message framing and diet and cancer prevention-related issues among African American adolescents. Cancer Nurs. 2010;33(2):102-9.

Saylor CF, Williams KD, Nida SA, McKenna ME, Twomey KE, Macias MM. Ostracism in pediatric populations. J Dev Behav Pediatr. 2013;34(4):279-287. doi:10.1097/DBP.0b013e3182874127.

Shi L, van Meijgaard J. Substantial decline in sugar-sweetened beverage consumption among California's children and adolescents. Int J Gen Med. 2010;3:221-224.

Simon P, Lightstone A, Baldwin S, Kuo T. Peer reviewed: declines in sugar-sweetened beverage consumption among children in Los Angeles county, 2007 and 2011. Prev chronic Dis. 2013;10E131.

Sisson SB, Church TS, Martin CK, et al. Profiles of sedentary behavior in children and adolescents: The US National Health and Nutrition Examination Survey, 2001–2006. Int J Pediatr Obes. 2009;4(4):353-359. doi:10.3109/17477160902934777.

Smedley B, Syme S. Promoting health: intervention strategies from social and behavioral research. Am J Health Promot. 2001;15(3):149-66.

Sorof J, Daniels S. Obesity Hypertension in Children. Hypertension. 2002;40(4).

Spence LA, Cifelli CJ, Miller GD. The role of dairy products in healthy weight and body composition in children and adolescents. Curr Nutr Food Sci. 2011;7(1):40-49. doi:10.2174/157340111794941111.

Striegel-Moore RH, Thompson D, Affenito SG, et al. Correlates of beverage intake in adolescent girls: The National Heart, Lung, and Blood Institute Growth and Health Study. J Pediatr. 2006;148(2):183-187. doi:10.1016/j.jpeds.2005.11.025.

Suchy FJ, Brannon PM, Carpenter TO, Fernandez, J.R.; Gilsanz, V.; Gould, J.B.; Hall, K.; Hui, S.L.; Lupton, J.; Mennella, J.; Miller, N.J.; Osganian, S.K.; Sellmeyer, D.E.; Wolf, M.A. National Institutes of Health Consensus Development Conference: Lactose Intolerance and Health. Ann Intern Med. 2010;152:792-796. doi:10.7326/0003-4819-152-12-201006150-00248.

Summerbell CD, Douthwaite W, Whittaker V, Ells LJ, Hillier F, Smith S, Kelly S, Edmunds LD MI. The association between diet and physical activity and subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence. Int J Obes. 2009;33:S1-S92. doi:10.1038/ijo.2009.80.

Summerbell CD, Moore HJ, Vögele C, et al. Evidence-based recommendations for the development of obesity prevention programs targeted at preschool children. Obes Rev. 2012;13(s1):129-132. doi:10.1111/j.1467-789X.2011.00940.x.

Šumonja S, Novaković B. Determinants of fruit, vegetable, and dairy consumption in a sample of schoolchildren, Northern Serbia, 2012. Prev Chronic Dis. 2013;10:130072. doi:10.5888/pcd10.130072.

Taveras EM, Gortmaker SL, Hohman KH, Horan CM, Kleinman KP, Mitchell K, Price S, Prosser LA, Rifas-Shiman SL, Gillman MW. A randomized controlled trial to improve primary care to present and manage childhood obesity: the High Five for Kids Study. Arch Pediatr Adolesc Med. 2011;165:714-722.

Taylor-Davis S, Smiciklas-Wright H. Responses of older adults to theory-based nutrition newsletters. J Am Diet Assoc. 2000;100(6):656-64.

Thomas C, Hyppönen E, Power C. Obesity and type 2 diabetes risk in midadult life: the role of childhood adversity. Pediatrics. 2008;121(5):e1240-9.

Tibbs T, Haire-Joshu D, Schechtman KB, et al. The relationship between parental modeling, eating patterns, and dietary intake among African-American parents. J Am Diet Assoc. 2001;101(5):535-541. doi:10.1016/S0002-8223(01)00134-1.

Tipton JA. Caregivers' psychosocial factors underlying sugar-sweetened beverage intake among non-Hispanic Black preschoolers: an elicitation study. J Pediatr Nurs. 2014;29:47-57.

Troiano RP, Berrigani D, Dodd KW, Masse LC, Tilert T, Mcdowell M. Physical activity in the United States measured by accelerometer. Med Sci Sport Exerc. 2008;40(1):181-188.

Tylavsky FA, Cowan PA, Terrell S, Hutson M, Velasquez-Mieyer P. Calcium intake and body composition in African-American children and adolescents at risk for overweight and obesity. Nutrients. 2010;2(9):950-964. doi:10.3390/nu2090950.

U.S. Department of Agriculture, Agricultural Research Service. USDA National Nutrient Database for Standard Reference, Release 24. 2011. Nutrient Data Laboratory Home Page, http://www.ars.usda.gov/ba/bhnrc/ndl.

U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015–2020 Dietary guidelines for Americans. 8th Edition. December 2015. Available online http://health.gov/dietaryguidelines/2015/guidelines/.

US Department of Health and Human Service. Physical Activity Guidelines Advisory Committee report. Washington, DC: US Department of Health and Human Services. https://health.gov/paguidelines/pdf/paguide.pdf. Published 2008.

van de Gaar VM, Jansen W, van Grieken A, Borsboom GJJM, Kremers S, Raat H. Effects of an intervention aimed at reducing the intake of sugar-sweetened beverages in primary school children: a controlled trial. Int J Behav Nutr Phys Act. 2014;11:98. doi:10.1186/s12966-014-0098-8.

van den Berg P, Neumark-Sztainer D, Eisenberg ME, Haines J. Racial/ethnic differences in weight-related teasing in adolescents. Obesity. 2008;16(S2):S3-S10. doi:10.1038/oby.2008.445.

Vargas-Garcia EJ, Evans CEL, Prestwich A, Sykes-Muskett BJ, Hooson J, Cade JE. Interventions to reduce consumption of sugar-sweetened beverages or increase water intake: evidence from a systematic review and meta-analysis. Obesity Reviews. July 2017. doi:10.1111/obr.12580.

Vartanian L.R, Schwartz M.B, Brownell K.D. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. Am J Public Health. 2007;97:667-675. doi:10.2105/AJPH.2005.083782.

Vaughn AE, Dearth-Wesley T, Tabak RG, Bryant M, Ward DS. Development of a comprehensive assessment of food parenting practices: the home self-administered tool for Environmental Assessment of Activity and Diet Family Food Practices Survey. J Acad Nutr Diet. 2017;117:214-227. doi:10.1016/j.jand.2016.07.021.

Vaughn AE, Ward DS, Fisher JO, Faith MS, Hughes SO, Kremers SO, Kremers SP, Musher-Eizenman DR, O'Connor TM, Patrick H, Power TG. Fundamental constructs in food parenting practices: a content map to guide future research. Nutr Rev. 2016;74(2):98-117. doi:10.1093/nutrit/nuv061.

Vereecken C, Keukelier E, Maes L. Influence of mother's educational level on food parenting practices and food habits of young children. Appetite. 2004;43(1):93-103.

Vereecken C, Maes L. Young children's dietary habits and associations with the mothers' nutritional knowledge and attitudes. Appetite. 2010;54(1):44-51.

Wang L, Dalton WT, Schetzina KE, et al. Home food environment, dietary intake, and weight among overweight and obese children in Southern Appalachia. South Med J. 2013;106(10):550-557. doi:10.1097/SMJ.0000000000000008.

Wang Y, Ge K, Popkin BM. Why do some overweight children remain overweight, whereas others do not? Public Health Nutr. 2003;6(6):549-558.

Wang M, Yu M, Fang L, Hu R.. Association between sugar-sweetened beverages and type 2 diabetes: A meta-analysis. J Diabetes Investig. 2015;6: 360-366. doi:10.1111/jdi.12309.

Wang Y, Jahns L, Tussing-Humphreys L, Xie B, Rockett H, Liang H, Johnson L. Dietary intake patterns of low-income urban African-American adolescents. J Am Diet. Assoc. 2010;110:1340-1345.

Wang Y.C, Bleich S.N, Gortmaker S.L. Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among US children and adolescents, 1988–2004. Pediatrics. 2008;121:e1604-e1614.

Wansink B, Pope L. When do gain-framed health messages work better than fear appeals? Nutr Rev. 2014;73(1):4-11.

Wardle J, Haase A.M, Steptoe A, Nillapun M, Jonwutiwes K, Bellisie F. Gender differences in food choice: The contribution of health beliefs and dieting. Ann Behav Med. 2004;27:107-116. doi:10.1207/s15324796abm2702_5.

Wardle J, Steptoe A, Bellisle F, Davou B, Reschke K, Lappalainen R, Fredrikson M. Healthy dietary practices among European students. Health Psychol. 1997;16: 443-450.

Watts A, Mâsse L, Barr S, Lovato C. Parent–child associations in selected food group and nutrient intakes among overweight and obese adolescents. J Acad Nutr Diet. 2014;114(1):1580-6

Wiecha J.L, Finkelstein D, Troped P.J Fragala M, Peterson K.E. School vending machine use and fast-food restaurant use are associated with sugar-sweetened beverage intake in youth. J Am Diet Assoc. 2006;106: 1624-1630.

Williams P, Cates S, Blitstein J, Hersey J. Nutrition-education program improves preschoolers' at-home diet: a group randomized trial. J Acad Nutr Diet. 2014;114(7):1001-8.

Wirtz J, Kulpavaropas S. The effects of narrative and message framing on engagement and eating intention among a sample of adult Hispanics. J Nutr Educ Behav. 2014;46(5):396-400.

Wolk R, Somers VK. Obesity-related cardiovascular disease: implications of obstructive sleep apnea. Diabetes, Obes Metab. 2006;8(3):250-260. doi:10.1111/j.1463-1326.2005.00508.x.

Wyse R, Campbell E, Nathan N. Associations between characteristics of the home food environment and fruit and vegetable intake in preschool children: a cross-sectional study. BMC Public Health. 2011;11:938.

Yee A.Z.H, Lwin M.O, Ho S.S. The influence of parental practices on child promotive and preventive food consumption behaviors: a systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2017;14(47). doi:10.1186/s12966-017-0501-3.

CHAPTER 8: APPENDICES

8.1 Parent report of home availability of beverages (Study 1, 2, and 3)

Beverage type	Always	Usually	Sometimes	Never
Whole, 1%, 2% or soy milk	❑	❑	❑	❑
Flavored milk (includes chocolate, strawberry or other flavors)	❑	❑	❑	❑
Hot chocolate, prepared	❑	❑	❑	❑
Regular soda pop	❑	❑	❑	❑
Diet soda pop	❑	❑	❑	❑
100% fruit juice	❑	❑	❑	❑
Fruit drinks (includes any fruit drink flavor, sports drinks and lemonade or sweetened tea)	❑	❑	❑	❑
Blended yogurt and juice drink or yogurt drink	❑	❑	❑	❑
Bottled water	❑	❑	❑	❑

8.2 Usual parent beverage intake (Study 1, 2, and 3)

Beverage Questionnaire (BEVQ-15)

Instructions:
In the past month, please indicate your response for each beverage type by marking an "X" in the bubble for "how often" and "how much each time".

1. Indicate how often you drank the following beverages, for example, if you drank 5 glasses of water per week, mark 4-6 times per week.
2. Indicate the approximate amount of beverage you drank each time, for example, if you drank 1 cup of water each time, mark 1 cup under "how much each time".
3. Do not count beverages used in cooking or other preparations, such as milk in cereal.
4. Count milk added to tea and coffee in the *tea/coffee with cream beverage category* **NOT** in the milk categories.

Participant ID _____

Date _____

	HOW OFTEN (MARK ONE)							HOW MUCH EACH TIME (MARK ONE)				
Type of Beverage	**Never or less than 1 time per week (go to next beverage)**	**1 time per week**	**2-3 times per week**	**4-6 times per week**	**1 time per day**	**2+ times per day**	**3+ times per day**	**Less than 6 fl oz (3/4 cup)**	**8 fl oz (1 cup)**	**12 fl oz (1 1/2 cups)**	**16 fl oz (2 cups)**	**More than 20 fl oz (2 1/2 cups)**
Water	o	o	o	o	o	o	o	o	o	o	o	o
100% Fruit Juice	o	o	o	o	o	o	o	o	o	o	o	o
Sweetened Juice Beverage/ Drink (fruit ades, lemonade, punch, Sunny Delight)	o	o	o	o	o	o	o	o	o	o	o	o
Whole Milk	o	o	o	o	o	o	o	o	o	o	o	o
Reduced Fat Milk (2%)	o	o	o	o	o	o	o	o	o	o	o	o
Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soymilk)	o	o	o	o	o	o	o	o	o	o	o	o
Soft Drinks, Regular	o	o	o	o	o	o	o	o	o	o	o	o
Diet Soft Drinks/Artificially Sweetened Drinks (Crystal Light)	o	o	o	o	o	o	o	o	o	o	o	o
Sweetened Tea	o	o	o	o	o	o	o	o	o	o	o	o
Tea or Coffee, with cream and/or sugar (includes non-dairy creamer)	o	o	o	o	o	o	o	o	o	o	o	o
Tea or Coffee, black, with/ without artificial sweetener (no cream or sugar)	o	o	o	o	o	o	o	o	o	o	o	o
Beer, Ales, Wine Coolers, Non-alcoholic or Light Beer	o	o	o	o	o	o	o	o	o	o	o	o
Hard Liquor (shots, rum, tequila, etc.)	o	o	o	o	o	o	o	o	o	o	o	o
Wine (red or white)	o	o	o	o	o	o	o	o	o	o	o	o
Energy & Sports Drinks (Red Bull, Rockstar, Gatorade, Powerade, etc.)	o	o	o	o	o	o	o	o	o	o	o	o
Other (list):	o	o	o	o	o	o	o	o	o	o	o	o

8.3 Child frequency of beverage intake (Study 1)

BEVERAGES
Please tell us about the beverages you drank over the past month.
Fill in one circle for each food item.

The following statements refer to what you drank over the past month.

1. Soda pop, any type (1 can or 1 glass)
- Never or less than once per month
- 1-3 cans per month
- 1 can per week
- 2-6 cans per week
- 1 can per day
- 2 or more cans per day

2. Fruit-flavored drinks such as Hawaiian Punch®, lemonade, Kool-Aid, or other non-carbonated fruit drink (1 glass or 1 juice box)
- Never or less than once per month
- 1-3 glasses per month
- 1 glass per week
- 2-6 glasses per week
- 1 glass per day
- 2 or more glasses per day

3. Orange juice (1/2 cup)
- Never or less than once per month
- 1-3 servings per month
- 1 serving per week
- 2-6 servings per week
- 1 serving per day
- 2 or more servings per day

a. Is the orange juice you drink fortified with calcium?
- Yes
- No
- Don't know

4. Café Latte, Café Mocha, Cappuccino, or Café Au Lait (1 tall or 1 large)
- Never or less than once per month
- 1-3 drinks per month
- 1 drink per week
- 2-6 drinks per week
- 1 drink per day
- 2 or more drinks per day

5. Coffee or tea (1 cup)
- Never or less than once per month
- 1-3 cups per month
- 1 cup per week
- 2-6 cups per week
- 1 cup per day
- 2 or more cups per day

6. Cocoa (hot chocolate) made with milk (1 cup)
- Never or less than once per month
- 1-3 cups per month
- 1 cup per week
- 2-6 cups per week
- 1 cup per day
- 2 or more cups per day

7. Milk to drink, white or chocolate (1 cup or 1 carton)
- Never or less than once per month
- 1-3 cups per month
- 1 cup per week
- 2-6 cups per week
- 1 cup per day
- 2-3 cups per day
- 4 or more cups per day

8. Milk on cereal (1 bowl)
- Never or less than once per month
- 1-3 bowls per month
- 1 bowl per week
- 2-4 bowls per week
- 5-7 bowls per day
- 2-or more bowls per day

9. Water, plain from tap or bottle (1 cup)
- Never or less than once per month
- 1-3 cups per month
- 1 cup per week
- 2-6 cups per week
- 1 cup per day
- 2-3 cups per day
- 4 or more per day

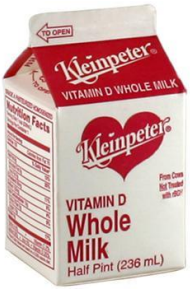
8.4 Parent Beverage nutrition knowledge (8 items) (Study 1)

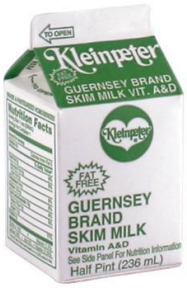
1. **Which is better for your child's health?**

Fruit drinks

<u>100% fruit juice **(correct answer)**</u>

2. **Which is better for your child's health?**





Whole milk

<u>low-fat milk **(correct answer)**</u>

3. **Which is better for your child's health?**

<u>Plain milk **(correct answer)**</u>

Sweetened flavored milk

4. **Which type of milk has the most calories in 1 cup?**
- o Whole chocolate milk **(correct answer)**
- o Whole white milk
- o 2% white milk
- o I do not know

5. **Which type of milk has the least calories in 1 cup?**
- o 1% white milk
- o Nonfat skim white milk **(correct answer)**
- o Nonfat skim chocolate milk
- o I do not know

6. **Which beverage has the most calories in 1 cup?**
- o 100% grape juice, unsweetened **(correct answer)**
- o Low fat, skim white milk
- o Regular cola, carbonated
- o I do not know

7. **About how many calories does a moderately active 9-12 year old boy or girl need each day?**
- o 1000-1600 calories
- o 1600-2200 calories **(correct answer)**
- o 2200-2800 calories
- o 2800-3400 calories
- o I do not know

8. **How much water should a child who is 9-12 years-old drink each day?**
- o 2-3 cups each day
- o 5-6 cups each day
- o 9-10 cups each day **(correct answer)**
- o I do not know

8.5 Dairy/calcium knowledge (8 items) (Study 1)

Mark true, false, or I do not know for the following questions:

1. 1 cup of calcium-fortified orange juice has about the same amount of calcium as 1 cup of dairy milk. **(T)**
2. 1 cup of non-dairy milk (soy, rice, or almond) has about the same amount of calcium as 1 cup of dairy milk. **(T)**
3. 1 cup of lactose free dairy milk (Lactaid) has about the same amount of calcium as 1 cup of regular dairy milk. **(T)**
4. Boys need more calcium than girls. **(F)**
5. Most 9-12 year-old girls are not getting enough calcium. **(T)**
6. Most 9-12 year-old boys are not getting enough calcium. **(T)**

7. **How much calcium is recommended for children 9-12 years-old each day?**
   - 500 milligrams each day
   - 800 milligrams each day
   - 1300 milligrams each day **(correct answer)**
   - I do not know

8. **How many cups of milk would a 9-12 year-old child need to drink each day to get the calcium he/she needs?**
   - 1 cup
   - 2 cups
   - 3 cups **(correct answer)**
   - 4 cups
   - 5 cups
   - I do not know

8.6 Knowledge about sugar in beverages (7 items) (Study 1)

Please look at this beverage product to answer the following questions:

For this bottle, list the number of servings, calories, and grams of sugars

1. Servings**: 2.5**
2. Calories**: 250**
3. Grams of sugars**: 69**

4. **How many calories are in 1 teaspoon of sugar?**

- o <u>16 calories **(correct answer)**</u>
- o 30 calories
- o 45 calories
- o I do not know

5. **What is the highest percentage of total calories that should come from sugar for children 9-12 years-old?**

- o <u>15% **(correct answer)**</u>
- o 30%
- o 45%
- o I do not know

6. How many calories are in a 12 ounce can of regular cola soda pop?

- o About 150 calories **(correct answer)**
- o About 200 calories
- o About 250 calories
- o I do not know

7. Which beverage has the most sugar in 1 cup?

- o 100% orange juice, unsweetened
- o Canned fruit punch
- o Regular cola, carbonated **(correct answer)**
- o I do not know

8.7 Child beverage intake reported by parents (Study 3)

In the PAST MONTH, indicate your response for YOUR CHILD for each beverage type by marking the bubble for "how often" your child usually drank the beverage.

	How often (Mark one)						
	Never or less than 1 time per week (go to the next beverage)	1 time per week	2-3 times per week	4-6 times per week	1 time per day	2+ times per day	3+ times per day
Soft drinks, regular	○	○	○	○	○	○	○
Diet soft drinks/artificially sweetened drinks (Crystal Light)	○	○	○	○	○	○	○
Sweetened juice beverage/drink (fruit ades, lemonade, punch, Sunny Delight)	○	○	○	○	○	○	○
Sports drinks (Gatorade, Powerade, etc.	○	○	○	○	○	○	○
Energy drinks (Red Bull, Rockstar, etc.)	○	○	○	○	○	○	○

8.8 Newsletters (Study 3)

Newsletter No. 1

What's in Your Glass?

"The benefits of drinking healthy beverages stack up quickly for your child. They include having a healthy diet and reduced risk of becoming overweight."

What is energy balance?

Energy is another word for "calories." Energy balance is when the number of calories you get from eating and drinking is the same as the calories you burn through physical activity. Energy balance can help your child have a healthy weight.

If your child drank one of these beverages, what could he or she do to burn the same amount of calories?

Energy IN

Type of beverage	Calories in 12 oz	Calories in 20 oz
Fruit punch	192	320
100% orange juice	168	280
Regular cola	136	280
Sports drink	99	165
Diet soda	0	0
Water	0	0

Energy OUT

Each activity for this time burns about 150 calories	Minutes
Shooting baskets	30
Playing touch football	30
Jumping rope	15
Walk 1 ¾ miles	35
Shovel snow	15
Rake leaves	30

How can healthy beverages help your child maintain energy balance?

- **Choosing water, diet, or low-calorie beverages** instead of sugar-sweetened beverages can reduce added sugars in your child's diet.
- **Sugar** is found naturally in some foods, like lactose in milk. However, sugar is added to many drinks like high-fructose corn syrup in sweetened beverages.
- **Added sugar** provides calories but no additional nutrients.
- **The 2015-2020 Dietary Guidelines for American** recommends that calories/day from added sugars should be **less than 10 %**.
- **Children** (9-12 years) get about **17%** of calories from added sugars.
- Children are drinking many **more calories** than ever before.
- **39%** of added sugars in the diet comes from **sugar-sweetened beverages**.
- **Nutrition Facts Panels** can help you learn about the calories in beverages and help your child make healthy choices.

TRUTH or MYTH?

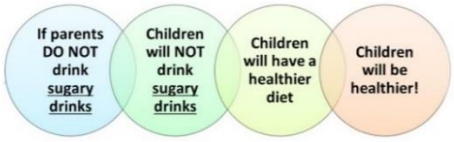
"Children need fruit drinks to get enough vitamin C"

That is a MYTH! Children can get vitamin C from a variety of whole food sources such as fruits and vegetables. Juice and fruit drinks can be easily fortified and those drinks are often loaded with sugar, making it an unhealthy way to get vitamin C.

UNIVERSITY OF MINNESOTA
Driven to Discover℠

What's in Your Glass?

"Parents who set a good example by NOT drinking sugary drinks are more likely to have children who DO NOT drink sugary drinks"



Be a Good Role Model!

As a parent, you are a family leader. You are your child's most important **role model**—especially when it comes to making healthy choices.
You have more power than you know! Use that power to improve your family's health.

What you drink with snacks or meals is as important as what you eat.

Adding a regular soda (20 ounces) to your snack or meal=250 calories.

Adding a glass of water to your snack or meal = 0 calories.

Be a *role model* for your child by choosing healthy beverages and paying attention to portion sizes.

Remember, moderation is key!

Making healthy choices at home

- **Drink** water with meals
- **Make** water more exciting by adding slices of lemon, lime, cucumber, or watermelon, or drink sparkling water.
- **Add** a splash of 100% juice to plain sparkling water for a refreshing, low-calorie drink.

Making healthy beverages choices when dining out

- **Choose** drinks without added sugar, like water, fat-free or low-fat milk, or unsweetened tea.
- If you choose beverages with added sugar, **Skip** refills and **Limit** portion sizes.

In the past two days, how often did your child see you drink a healthy beverage?

Think about the following occasions and your selection of beverages.

Possible occasions	What did your child see you drink? (fill in)	Possible beverage options
Breakfast		**100% fruit juice**
Lunch		**Sweetened tea**
Afternoon snack		**Sport drink**
Dinner		**Water**
Bedtime snack		**Fruit drink**
Mini meal		**Milk**
Treat		**Soda**

TRUTH or MYTH?

"Research shows that if parents drink sugar-sweetened beverages, children aged 9-17 years are more likely to drink these beverages."

That is TRUTH! One study showed that the amount of sugar-sweetened beverages children drank increased as the amount that parents drank increased. Parents and children (9-17 years) share a common home and social environment making parents potential role models. Reference: Pinard et al. Eating Behaviors 2011;12:313-6.

References:
Centers for Disease Control and Prevention, Rethink your drink, http://www.cdc.gov/healthyweight/healthy_eating/drinks.html
USDA Choose My Plate, Make Better Beverage Choices, https://www.choosemyplate.gov/ten-tips-make-better-beverage-choices
National Institutes of Health, We Can! Tip Sheet: Be A Good Health Role Model, https://www.nhlbi.nih.gov/health/educational/wecan/downloads/tip-role-model.pdf

University of Minnesota Driven to Discover℠

What's in Your Glass?

"Parents who DO NOT make sugary drinks available at *home* are more likely to have children who DO NOT drink sugary drinks"

Out of sight, out of mind!

- People tend to consume **more** when they have easy access to beverages.
- **Sugars** add calories without nutrients.
- Buying **healthy beverages** for your child is easy when you know what types to buy.

Healthy Tips at *Home*:

- Move healthier beverages to eye level at the front of the fridge or cupboard.
- "Stock the fridge" with healthy beverages. Keep a pitcher or bottles of cold water in the fridge.
- Serve water with meals.

Healthy Tips at the *Store*:

- Look at the Nutrition Facts label to find **healthy choices**.
- Look for beverages **low in added sugars**.
- Read the ingredient list and make sure that **added sugars** are NOT one of the first ingredients.
- Some **names for added sugars** include *sucrose, glucose, high-fructose corn syrup, corn syrup, and fructose.*

Use this chart as a guide to make smart drink choices available for your child. Post it on your refrigerator or take it to the store.

GO Beverages—Drink almost anytime. (**Lowest** in sugar)
SLOW Beverages—Drink sometimes, or less often. (**Higher** in added sugar and calories)
WHOA Beverages—Drink only once in a while or on special occasions. (**Highest** in added sugar and calories)

GO	SLOW	WHOA
Water, fat-free milk, or 1% low-fat milk, unsweetened ice tea	2% low-fat milk, 100% fruit juice, sports drinks	Whole milk, regular soda, sweetened iced teas and lemonade, fruit drinks with less than 100% fruit juice

TRUTH or MYTH?

"Fruit drinks are healthy (or at least healthier than soda)"

That is a MYTH! Fruit drinks contain little or no actual fruit juice. Many fruit drinks are mostly added sugar and water and contain nearly as many calories as soda.

References:
Centers for Disease Control and Prevention, Healthy Weight, http://www.cdc.gov/healthyweight/healthy_eating/portion_size.html
Centers for Disease Control and Prevention, Rethink Your Drink, http://www.cdc.gov/healthyweight/healthy_eating/drinks.html
National Institutes of Health, Food Shopping Tips, http://www.nhlbi.nih.gov/health/educational/wecan/eat-right/smart-food-shopping.htm
National Institutes of Health, GO, SLOW, and WHOA Foods, http://www.nhlbi.nih.gov/health/educational/wecan/downloads/go-slow-whoa.pdf

University of Minnesota
Driven to Discover℠